Inconstancy of schizophrenic language and symptoms

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Is there a schizophrenic language?

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Abstract: Among the many peculiarities of schizophrenics perhaps the most obvious is their tendency to say odd things. Indeed, for most clinicians, the hallmark of schizophrenia is "thought disorder" (which is usually defined tautologically as incoherent speech). Decades of clinical observations, experimental research, and linguistic analyses have produced many hypotheses about what, precisely, is wrong with schizophrenic speech and language. These hypotheses range from assertions that schizophrenics have peculiar word association hierarchies to the notion that schizophrenics are suffering from an intermittent form of aphasia. In this article, several popular hypotheses (and the observations on which they are based) are critically assessed. Work in the area turns out to be flawed by errors in experimental method, faulty observations, tautological reasoning, and theoretical models that ignore the complexities of both speech and language. This does not mean that schizophrenics are indistinguishable from nonschizophrenics. They are clearly deviant in many situations. Their problem, however, appears to be in processing information and in selective attention, not in language itself.

Keywords: schizophrenia; language; cognition; attention; psycholinguistics; information processing

Consider the following excerpts taken from several published conversations:

a. Then, I always liked geography. My last teacher in the subject was Professor August A. He was a man with black eyes. I also like black eyes. There are also blue and gray eyes and other sorts, too. I have heard it said that snakes have green eyes. All people have eyes. There are some, too, who are blind. These blind people are led by a boy. It must be terrible not to be able to see. There are people who can't see, and, in addition, can't hear. I know some who hear too much. One can hear too much. There are many sick people in Burgholzli; they are called patients. (Bleuler 1950, p. 17)

b. Everybody needs sex. . . . I haven't had sex for five years. The clock is in this room because they want patients to learn how to tell time. I know Mary Poppins, and she lives in Massachusetts. I didn't like the movie "Mary Poppins." They messed up the book, so they could try to win the Oscar. Movies come from real life. This morning, when I was at Hillside, I was making a movie. I was surrounded by movie stars. The x-ray technician was Peter Lawford. The security guard was Don Knotts. . . . Is this room painted blue to get me upset? My grandmother died four weeks after my eighteenth birthday. (Sheehan 1981, p. 69)

c. Yes. Of course, the whole thing wasn't my idea. So, I suppose I'd be perfectly happy if he came back and decided to do it all on his own. If I could make two trips myself, I don't see why he can't. (Laffal 1979, p. 309)

d. Well, I wonder if that part of it can't be – I wonder if that doesn't – let me put it frankly; I wonder if that doesn't have to be continued? Let me put it this way: let us suppose you get the million bucks, and you get the proper way to handle it. You could hold that side? (Gold 1974, p. 117)

I have asked several colleagues (three clinical psychologists) to read these passages and then to rate them on a five-point scale ranging from "schizophrenic" to "normal." Invariably, excerpts a and b are judged "schizophrenic." It is easy to see why. The speakers jump from one subject to another, produce peculiar associations, and sound quite bizarre. Excerpts a and b are excellent examples of how clinicians and laymen expect schizophrenics to talk.

Unlike the first two excerpts, the third (c) is usually rated "normal." It is neither bizarre nor particularly obscure. Excerpt c presents a problem for researchers interested in schizophrenia because it, too, was produced by a patient diagnosed schizophrenic (see Laffal 1979, for diagnostic criteria). Schizophrenic speech, you see, may not always be "schizophrenic."

Excerpt d was rated moderately schizophrenic. It is not bizarre, but it is repetitive, loose, and difficult to follow. It was produced by former U.S. President Richard Nixon (diagnosis unknown). Many of his colleagues produced similar speech (Gold 1974). This excerpt brings up another problem for researchers. Difficult-to-follow speech is not limited solely to schizophrenics. Schizophrenics may say things that appear strange to listeners, but so do normal people and nonschizophrenic patients. The following excerpt, for example, comes from a 47-year-old hypomanic patient:

> Women of America, it behooves you one and all to help at this, the most interesting epoch of the World's History, in every way possible, the march of civilization, the march to victory! I will play you Beethoven's Great Symphony with its four fateful opening notes – sol, sol, sol mi. . . . – V, V, V, V, the Day of the Century has dawned! (R. A. Cohen 1975, p. 1020)

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The researcher studying schizophrenia is clearly in a difficult position. On the one hand, schizophrenic speech is easy to recognize (as in extracts a and b), but, on the other hand, it makes up only a small part of schizophrenic discourse (see Andreasen & Grove 1979 and Rochester & Martin 1979). Moreover, nonschizophrenics may also produce similar bizarre speech. To get around these difficulties, theorists and researchers have focused not merely on what schizophrenics say but also on how they say it. Many papers have been published, the literature has been reviewed several times (Maher 1966; 1972; Pavy 1968; Schwartz 1978b), but just what is wrong with schizophrenic speech remains a puzzle. The present paper is not merely another literature review. Instead, the focus here is on the assumptions underlying various research approaches. It is the present thesis that research in the area of schizophrenic speech and language is flawed by errors in experimental method, faulty observations, tautological reasoning, and theoretical assumptions that do not capture the complexities of speech or language. Although it may be true that schizophrenics have cognitive problems, the evidence for "schizophrenic language" is not at all compelling.

In order to answer the question, Is there schizophrenic language?, it is necessary to make clear what is meant by the terms "schizophrenia," "language," and "schizophrenic language." This paper begins, therefore, with some definitions.

What is schizophrenia?

It is impossible to write about schizophrenia without mentioning the frequently lamented unreliability of the "schizophrenic" diagnosis. Many authors have worried about diagnostic unreliability, and some have even argued that diagnoses are "of little value," being simply a means for "providing employment" (Browning & Stover 1971, p. 403). There is no doubt that unreliable diagnoses can exert a pernicious effect on research. If the subject population used in an experiment is heterogeneous, meaningful results are difficult to obtain and conflicting findings across studies are inevitable. Clearly, for research purposes, perfect agreement among diagnosticians would be ideal. Perfect agreement is unlikely, however, because schizophrenia is not a homogeneous diagnostic category. Bleuler (1950) referred to "the schizophrenias," and there is a fair amount of evidence suggesting that he was right (Wing 1978). Nevertheless, interrater diagnostic agreement for the category "schizophrenia" is relatively high.

Beck and his coworkers (Beck, Ward, Mendelson, Mock & Erbaugh 1962) found an average interrater reliability of 70 percent among four experienced psychiatrists for the major diagnostic categories of psychosis, neurosis, and character disorder. Similar reliability levels (73 to 74 percent) have been reported by Kreitman, Sainsbury, Morrissey, Towers, and Scrivner (1961) and Sandifer, Petlos, and Quade (1964). Even higher agreement has been reported by Yusin, Nihira, and Mortashed (1974).

All of these studies have been criticised on methodological grounds (diagnostic judgments were not always independent) and statistical ones (the statistics used were not corrected for chance agreement; Fenton, Mosher & Matthews 1981; Spitzer & Fleiss 1974). Using the statistic kappa (an intraclass correlation that corrects for chance agreement), Spitzer and Fleiss (1974) found the reliability of the schizophrenic diagnosis to range from .32 to .77 (1.00 indicates perfect agreement) in six studies. The mean kappa was .57. More recently, Spitzer, Forman, and Nee (1979) reported a kappa of .82 for the schizophrenic diagnosis. These estimates of psychiatric reliability compare quite favorably with those achieved in other branches of medicine.

Using established laboratory "tests," experienced radiologists disagree about 30 percent of the time when evaluating chest films (Herman & Hessel 1975), and pathologists frequently disagree about whether tissue is malignant (MacMahon, Morrison & Ackerman 1973). The fact is that many medical diagnoses are as difficult to make as psychiatric ones (over 30 percent of appendectomies are performed on normal appendices; Thomas & Mueller 1969).

Pathologists may have difficulty deciding whether a particular tissue sample is malignant, but no one has argued that this means that cancer does not exist. It is similarly illogical to conclude that schizophrenia cannot be studied because it is heterogeneous and sometimes difficult to diagnose (Mosher 1978). Schizophrenia's heterogeneity does make it necessary, however, for investigators to specify carefully the relevant characteristics of the schizophrenic studied in their particular experiment. Just saying that a patient has been "repeatedly diagnosed as schizophrenic" (Chaika 1974, p. 259) is not enough. Instead, researchers should provide a detailed rationale for their subjects' diagnoses, using rating scales (Overall & Woodward 1975) and careful clinical descriptions.

The present argument is not meant to imply that there is one true set of diagnostic criteria. The diagnostic criteria promulgated in the *Diagnostic and Statistical Manual of Mental Disorders – DSM III* (American Psychiatric Association 1980) are as arbitrary as the "Research Diagnostic Criteria" (Spitzer, Endicott & Robins 1978) and the "Feighner Criteria" (Feighner, Robins, Guze, Woodruff, Winokur & Munoz 1972) from which they were derived (Fenton et al. 1981; Overall & Hollister 1979). Nevertheless, these diagnostic systems do permit researchers and clinicians to decide with some degree of reliability whether or not a patient meets the criteria for being diagnosed schizophrenic. As previously noted, Spitzer, Forman, and Nee (1979) found the reliability of the *DSM III* criteria to be higher (kappa = .82) than for many purely somatic conditions.

A possible problem for investigators studying schizophrenic speech and language is that "incoherence, marked loosening of associations, markedly illogical thinking or marked poverty of content of speech" (American Psychiatric Association, p. 188) is one of the *DSM III* criteria for schizophrenia (particularly when associated with blunt affect, delusions, hallucinations, or grossly disorganized or catatonic behavior). If disordered speech is a criterion for the schizophrenic diagnosis, then it is no surprise that diagnosed schizophrenics show incoherence, loosening of associations, and so on. Although the dependence of the diagnosis of schizophrenia on "incoherence" often makes it difficult to separate the two,

research may still proceed if investigators are clear about what they mean by language – the subject of the next section.

What is language?

Although Bleuler (1950) noted the peculiar speech of schizophrenics, he did not feel that their deficit was linguistic. "The abnormality," he wrote, "does not lie in the language itself, but rather in its content" (p. 147). Some writers on schizophrenia have failed to make this distinction. Lewis (1944), in his preface to Kasanin's well-known *Language and Thought in Schizophrenia*, uses the terms "thought," "language," and "speech" interchangeably. Cameron (1944), in the same volume, agrees, stating "it is quite impossible in human adults to separate thinking from language behavior" (p. 51). As Rochester and Martin (1979) argue, the failure to distinguish among thought, language, and speech leads to tautological arguments such as: "thought disorder is when talk is incoherent and talk is incoherent when the thought is disordered" (p. 5).

Linguists have long noted the conceptual distinction between thought, language, and speech. For example, the Swiss linguist Saussure (1915) distinguished between *langue*, an abstract set of linguistic rules, and *parole*, individual speech performance. *Langue* is present in the brain of everyone who speaks a language, whereas *parole* is, at any given time, created using *langue*. The importance of this distinction is that *parole* (speech) is created using a language's rules, but it is also influenced by other factors. That is, what one says is determined not only by language but also by needs, motives, intelligence, the situation, and even one's state of health.

The distinction between *langue* and *parole* is a common one in linguistics (see Hörmann 1971, for a review); it also underlies Chomsky's (1972) distinction between "competence" and "performance." According to Chomsky, a person who has internalized linguistic (syntactic, semantic, and phonological) rules has developed "competence." The observed speech of such a person ("performance") does not simply reflect competence, however. It is also determined by factors such as the situational context, the speaker's motives, and the speaker's memory ability. According to Chomsky, "To study a language, then, we must attempt to dissociate a variety of factors that interact with underlying competence to determine actual performance" (p. 16). [See also Chomsky: "Rules and Representations" *BBS* 3(1) 1980.]

A dissociation among language, speech, and thought as well as the distinction between competence and performance can be seen clearly in studies of "abnormal" populations. Furth (1961) studied deaf and normal children in a concept formation task and found that concepts may be formed without the child knowing a word for the particular concept being learned. Similarly, commissurotimized patients are able to perform tasks requiring abstract thinking with their right cerebral hemispheres – the hemisphere that lacks the capacity to talk (Sperry 1968). [See also Bradshaw & Nettleton: "The Nature of Hemispheric Specialization in Man" *BBS* 4(1) 1981.]

To summarize, language is an abstract set of semantic, syntactic, and phonological rules learned by every speaker. Speech (what someone actually says) reflects the speaker's knowledge of these rules but is also affected by many other factors, including (but not limited to) the situational context, the speaker's motives, the speaker's cognitive ability, and even the speaker's emotional state. Thought is reflected in speech, but it is not the same phenomenon. Thought can proceed without speech, and it can be studied independent of verbal productions (see Posner 1978).

What is meant by schizophrenic language?

Few writers and researchers believe that there is a language called "Schizophrenic" with its own linguistic rules like French or English (although see Forrest 1976). Usually, all that is meant by the term "schizophrenic language" is that schizophrenics sometimes say strange things. But as indicated in the preceding section, linguistic performance is determined by more than just language competence. Schizophrenics may be perfectly competent linguistically and still be incoherent if they have difficulties in any of the other factors affecting linguistic performance.

It is also important to note that not all schizophrenics display peculiar speech. Estimates vary (Andreasen & Grove 1979; Gerson, Benson & Frazier 1977; Rochester & Martin 1979), but all agree that the majority of schizophrenics speak coherently most of the time. Moreover, peculiar speech is found in other patients (Andreason & Grove 1979) about as frequently as among schizophrenics. To be precise, then, the goal of this paper is to examine the evidence that some schizophrenics have a language (competence) deficit (semantic, syntactic, or phonological), which is responsible for their strange speech. Alternative explanations for their strange verbalizations (information-processing deficits, pragmatic deficits) are also explored.

Associationism and schizophrenic language

By far the largest amount of research in schizophrenic speech and language has been conducted within an associationistic framework. Associationistic studies are of several types, but they focus on stimulus-response models of speech production and comprehension. Common in this literature is a preoccupation with "conditioning."

Verbal conditioning. There have been many attempts to get schizophrenics to alter their speech production by "reinforcing" certain words or classes of words (Salzinger & Pisoni 1958; 1961; Ullmann, Krasner & Edinger 1964). Sometimes these procedures work; sometimes they do not (Frankel & Buchwald 1969). It is possible that some schizophrenic symptoms can be ameliorated by verbal conditioning (Meichenbaum 1973; Salzinger, Portnoy, Pisoni & Feldman 1970), but, as an explanation for why schizophrenics produce incoherent speech in the first place, the verbal conditioning literature produces a tautology: Schizophrenics produce peculiar verbalizations because such behavior is reinforced.

Some investigators (Levitz & Ullmann 1969, for example) have succeeded in getting nonschizophrenic subjects to give rare responses on a word association task using "social reinforcement." They argue that these results are consistent with a "behavioral" theory of schizophrenia. That is, schizophrenics give rare associations because they are "reinforced" for doing so. Meiselman has (1978) challenged this reasoning, arguing that such findings merely reflect normal "flexibility," not schizophrenia. He neglected to mention another problem with this line of reasoning – there is little evidence that schizophrenics give rare associations in the first place (see Schwartz 1978a; 1978b, and the next section).

Schizophrenic word associations. For over 70 years, researchers have claimed that schizophrenics give rarer word associations than nonschizophrenics. This "finding" has, in turn, become an important tenet of some theories of schizophrenia (see Mednick 1958, for example). Peculiar word association hierarchies imply deviant semantic structures – a language deficit in the current terminology. Unfortunately, methodological shortcomings and errors in data analysis render the support for the schizophrenia–word association relationship largely illusory (Schwartz 1978a; 1978b). Some studies used extremely heterogeneous experimental groups (Kent & Rosanoff 1910). Others failed to control for age, sex, educational level, or hospitalization (Johnson, Weiss & Zelhart 1964). One study (Sommer, Dewar & Osmond 1960) was flawed by inconsistencies in the number of subjects for whom data were reported (see Schwartz 1978a).

Some studies have found that schizophrenics give *more* common associations than nonschizophrenics. For example, a comparison of Horton, Marlowe, and Crowne's (1963) reported commonality of college students' word associations with those reported for schizophrenics shows that the latter produce more common responses than the former.

Contradictory findings have been reported by investigators using similar techniques. For example, Frankel and Buchwald (1969) were unable to condition schizophrenics to make *common* word associations. Quite the opposite result was reported by Deckner and Blanton (1969), who found that schizophrenics took longer to learn to choose a *weak* associate of a word than either patients or normal subjects.

Several studies have reported no difference between schizophrenic and nonschizophrenic word associations. Fuller and Kates (1969) found no differences between schizophrenics and normal individuals either in the frequencies of their word associations or in their respective tendencies to give idiosyncratic responses. Similarly, Lisman and Cohen (1972) found that "the [schizophrenic] patients sample from associative repertoires that are essentially the same as [those of the] normals" (p. 187).

Although not directly concerned with word associations, studies by Larsen and Fromholt (1976), Russell and Beekhuis (1976), and Traupmann, Berzofsky, and Kesselman (1976) have all found that memory organization hierarchies are similar among schizophrenics and nonschizophrenics. Similar hierarchies of organization imply similar association strategies. (This point is returned to later.)

Using another task, Chapman and Chapman (1973) have reported that schizophrenics are biased toward common rather than rare word meanings, just the opposite of the pattern expected if schizophrenics give rare associations.

There are more studies in this area (Namyslowska 1975; also see Ostwald & Zawarin 1980). Some find schizophrenics give fewer common responses than normal individuals, some do not. Overall, there is little support for the hypothesis that schizophrenics have deviant word association hierarchies or that they give more rare word associations than nonschizophrenics.

Further work in this area, no matter how careful, is unlikely to lead to greater understanding of schizophrenia because of the limitations of the word association technique. A major difficulty is deciding what constitutes a "rare" response. Different sets of norms yield different results (compare the Kent & Rosanoff 1910 norms with those reported by Moran, Mefferd & Kimble in 1964). Moreover, popular responses change over time (Jenkins & Russell 1952).

There are also important individual differences in word association responding. There are differences between males and females (Palermo & Jenkins 1965) and among different language speaking groups (Russell & Meseck 1959). Education also makes a big difference. Wreschner (1907) found that university students and faculty were much more likely than those with less education to respond with words belonging to the same parts of speech as the stimulus words. Rosenzweig (1964) found more commonality of responding among students than "workers." He went on to conclude that social class groups may have different verbal habits. Thus, schizophrenics (who tend to come more from the lower social classes; Hollingshead & Redlich 1958) may be expected to give fewer common responses for reasons other than their illness.

A final problem with word association tests is the possible presence of idiosyncratic response "sets" (called "idiodynamic sets" by Moran et al. 1964). For instance, some individuals respond to the words "won" and "fore" with numbers, whereas others respond with words related to their nonnumeric meanings. Idiosyncratic sets have been extensively studied (see Mefferd 1978 for a review), and several appear to recur: those related to object-referent, conceptual-referent, and speed. Contrary to the language deviance hypothesis, schizophrenics show the same sets as nonschizophrenics (Mefferd 1978; Moran et al. 1964).

The set a subject adopts can be manipulated by carefully structuring the word association list. That is, if the words "won" and "fore" are preceded by the unambiguous number "three," number associations are much more likely than if they are preceded by the word "golf." The importance of a word association list's organization is emphasized by Mefferd (1978), who states that "almost anyone can be made to appear 'schizophrenic'" (p. 206), provided the proper sequence of words is used.

Methodological weaknesses, equivocal findings, and the difficulties inherent in the word association technique itself render the support for the hypothesis that schizophrenics give rare word association responses highly questionable. Theories that rely on a relationship between schizophrenia and rare word associations are built on a shaky foundation. Even those studies that do find schizophrenics performing differently from nonschizo-

phrenics may be explained by the schizophrenics' lower social class – a factor of performance, not competence. The failure to demonstrate unusual word association hierarchies or different response sets among schizophrenics also argues against a language deficit.

Some experimenters who do not favor the hypothesis underlying the word association studies have argued that schizophrenics are "biased" toward a word's strongest meaning. Work in this area is reviewed in the next section.

Schizophrenic response biases. According to Chapman and Chapman (1965), "a person has, to any one word, a series of meaning responses" (p. 139). These responses form hierarchies from strong to weak. In contrast to the word association researchers, Chapman and Chapman assume that schizophrenics' hierarchies are similar to those of nonschizophrenics, but that the groups differ in their "response biases." Schizophrenics tend to rely on a word's strongest meaning to the relative exclusion of its other, weaker meanings. Biases are measured by giving subjects a choice of word meanings. The following is an example of a typical item from a study by Chapman, Chapman, and Miller (1964):

When the farmer bought a herd of cattle, he needed a new pen.

This means: *A*. He needed a new writing implement.
B. He needed a new fenced enclosure.
C. He needed a new pick-up truck.

The word "pen" was previously scaled for meaning-response strength: its strongest meaning was determined to be "writing implement." Schizophrenics are expected to choose response *A* more often than normal respondents, who know that a weaker response, *B*, is correct. The methodological weaknesses of this technique (the difficulty in controlling for differences in word knowledge and overall intellectual functioning) has been discussed in detail by Schwartz (1978b) and will not be repeated here, except to note the crucial importance of chance responding.

In multiple choice and similar tasks, a subject may choose the correct alternative merely by chance. In theory, it should be possible to correct for chance responding, but in practice, it is usually quite difficult because subjects have partial information about the words. For example, the irrelevant alternative (*C* in the foregoing example) is rarely chosen by schizophrenic or nonschizophrenic subjects. The schizophrenics may be merely eliminating the irrelevant alternative and guessing between the others. This appears to be what happened in a study by Boland and Chapman (1971), in which schizophrenics chose an irrelevant meaning for a word 6 percent of the time, the correct meaning 42 percent of the time and an associative-distractor (incorrect meaning) 52 percent of the time.

Schizophrenics, by the way, are not the only ones who make errors in this kind of task. Prison immates (Rattan & Chapman 1973) and nonschizophrenic patients (Naficy & Willerman 1980; Neuringer, Fiske & Goldstein 1969; Neuringer, Fiske, Schmidt & Goldstein 1972) behave similarly. One study found schizophrenics to choose more *weak* meanings than nonschizophrenic controls (Neuringer, Kaplan & Goldstein 1974).

If schizophrenics have a bias toward strong meanings of words, it is certainly not a very strong bias, nor is it unique to schizophrenics. One hypothesis that seems reasonable given the pattern of results is that the effect is attributable to lowered intellectual functioning. The small differences found between studies may merely be the result of random fluctuations in the guessing rate of schizophrenics.

Associationistic studies: evidence for a schizophrenic language deficit. The literature on word associations and response biases provides little convincing evidence that schizophrenics produce rare word associations or that they are insensitive to verbal context. They do seem to be somewhat less knowledgeable about word meanings, but this is a performance deficit also characteristic of nonschizophrenic hospitalized patients, prison inmates, and anyone else operating at a low intellectual level. Social class membership may also play a role (Rosenzweig 1964).

Even if meaning biases or rare associations could be reliably demonstrated, their value in helping us understand schizophrenic language competence would be doubtful. The problem is the focus on single words. In natural speech, the pronunciation of a word, its meaning, and its syntactic role can only be determined by an analysis of the context in which it occurs. In addition, the notion that each word presented to a subject elicits a strong meaning response unless the context demands some weaker meaning, is contradicted by the speed with which language is comprehended. The time necessary to transmit from ear to brain the number of signals required by a theory such as Chapman's would make normal conversation impossible (see Lashley 1951; Lenneberg 1967).

It should also be emphasized that sentences are more complex than the sum of the meanings of their constituent words. The order of words is as important in determining a sentence's meaning as the rules of syntax. (Any novelist can tell you that "John loves Mary" is not the same as "Mary loves John.") Even when all the words in a sentence elicit a strong meaning response, the meaing of the sentence still depends on how the various words are ordered. Theories based solely on the meanings of individual words provide only an incomplete account of either normal or disordered language.

Schizophrenics' knowledge of linguistic rules

A more direct approach to the study of schizophrenic language competence has concentrated on schizophrenics' ability to apply syntactic, semantic, phonological, and pragmatic rules in their speech (see Maher 1972 for a review).

A problem for this approach is that schizophrenics are not the only people who make semantic and syntactic errors. Other patient groups and even normal speakers make similar errors. This presents a problem for theories such as Chaika's (1974). On the basis of errors made by one schizophrenic patient, Chaika hypothesized that schizophrenic speech results from an intermittent, cyclic aphasia. As Fromkin (1975) has pointed out, however, errors similar to those noted by Chaika are produced by normal speakers.

Chaika (1977) in a response to Fromkin and other critics (Lecours & Vanier-Clément 1976) argued that schizophrenic speech errors differ from qualitatively similar errors produced by normal speakers because they persist over longer periods and because normal slips are understandable – they can be corrected with reference to the context. Schizophrenic slips, she argues, are anomalous, and schizophrenics do not correct their errors when asked to. Similarities between the speech of aphasics (particularly Wernicke's aphasics) and schizophrenics – as well as differences – have been noted by several writers (Andreasen & Grove 1979; DiSimoni, Darley & Aronson 1977), but whether or not schizophrenic speech is the result of aphasia remains problematic.

There is some doubt whether any amount of purely descriptive argument will settle the issue. Authors use similar data to make quite different points. In the absence of some generally agreed-upon method for deciding whether a speech error is "aphasic" or not, this argument could go on indefinitely. Fortunately, there are other relevant sources of data.

Gerver (1967), for instance, found that semantically and syntactically correct sentences were easier for schizophrenics to recall than random word strings. Moreover, the increase in recall from random words to sentences was as large for chronic schizophrenics as for normal individuals. Truscott (1970) also found schizophrenics to make use of the regularities of English in recalling sentences. Rochester, Harris, and Seeman (1973) found schizophrenics to be aware of (and to use) syntactic units in their recall. A similar conclusion was reached by Carpenter (1976). These studies are not without faults (see Rochester & Martin 1979); particularly troubling is their tendency to reduce language to what may be studied in the laboratory (see Schwartz 1978b for a related discussion). Nevertheless, taken together, they seem to suggest that schizophrenics do have the ability to use at least syntactic if not semantic and pragmatic rules in experiments of this sort (Andreasen & Grove 1979).

Schizophrenics may have the ability to use certain linguistic rules, but, as excerpts a and b at the beginning of this paper illustrated, their speech is sometimes quite difficult to follow. Several theorists have suggested that schizophrenic language lacks normal redundancy. This idea is considered next.

The immediacy hypothesis

Salzinger and his colleagues have used the "cloze" procedure (a technique that requires judges to guess what words have been omitted from a speech transcript) in a research program with schizophrenics.

In a typical study (Salzinger, Portnoy & Feldman 1964), they found that normal judges were less able to guess the words omitted from the first 100 words of a schizophrenic's transcript than those omitted from the transcripts of nonschizophrenic patients. The judges' performances were even worse for the second 100 words of the schizophrenic transcript, although for nonschizophrenic transcripts the judges actually improved during the second 100 words. Further experiments (reviewed in Salzinger, Portnoy & Feldman 1978) indicated that judges were able to guess words omitted from schizophrenic transcripts as well as those omitted from the transcripts of nonschizophrenics when they were provided with only a few words of context (for example, the four words surrounding the omitted word). When lengthy context was provided (14 surrounding words), it was easier to guess the words omitted from the nonschizophrenic transcripts than those omitted from the schizophrenic ones. These findings were interpreted to support an "immediacy hypothesis" that schizophrenic behavior, verbal or otherwise, is primarily controlled by stimuli immediate in the environment. Thus, for schizophrenics, small amounts of context afford high guessability because they represent the immediate stimuli that control responding. Large amounts of context do not measurably improve the ability to guess words omitted from schizophrenics' transcripts because schizophrenics are not responding to stimuli remote in time.

Schwartz (1978b), in a review of this work, suggested that at least some of these findings may be attributable to the method of measurement. At low levels of context, it is difficult to guess any of the omitted words correctly, irrespective of whose protocol they come from. This criticism does not apply to the data for what Salzinger et al. (1978) call "function" words (conjunctions mostly, but some prepositions) in which schizophrenic speech was actually *more* predictable than nonschizophrenic speech at low levels of context but less predictable when considerable context was provided. In addition, the accuracy of guesses for the second 100 words of schizophrenic discourse correlated -0.48 with the number of days the patient was hospitalized. Another interesting finding was that when schizophrenics serve as judges for such transcripts (they themselves guess the missing words), their performance also deteriorates with increasing context (deSilva & Hemsley 1977).

Schizophrenics do indeed appear to attend to only a few stimuli. Although Salzinger et al. (1978) are unclear on this point, their "immediacy hypothesis" appears to refer to stimuli close in time or space. In many ways, the immediacy hypothesis makes predictions similar to "attentional" hypotheses. Because conjunctions occur at those points in a sentence that are most vulnerable to distraction or shifts in attention, there is a strong possibility that Salzinger's findings are to a large extent a reflection of the inability to sustain attention (see Maher 1972).

It should be noted that Rutter and his colleagues (Rutter, Draffan & Davies 1977; Rutter, Wishner & Callaghan 1975; Rutter, Wishner, Kopytynska & Button 1978) have been unable to obtain the results reported by Salzinger and his colleagues. Salzinger, Portnoy, and Feldman (1979) point out differences between Rutter et al.'s studies and their own, the most important being that Salzinger et al.'s patients were not on medication whereas Rutter et al.'s were. Another possibility is that outcomes depend on how seriously disorganized schizophrenic patients are. In a study by Manschrek, Maher, Rucklos, and White (1979), only the most "thought-disordered" schizophrenics produced unpredictable speech. Salzinger et al.'s findings are in accord with many attentional theories (these are addressed later in the paper). Their relevance to the question of schizophrenic language is problematic.

According to Salzinger, Portnoy, and Feldman (1966), the "speaker in emitting his words must react not only to

the word that he has just uttered but to the last two words, the last three words, usually to many words uttered previously" (p. 172). As noted by Schwartz (1978b), Salzinger et al. must choose words to be the basic units of speech because smaller linguistic elements (morphemes, for example) have very few associative relationships, and the neuromuscular responses necessary to produce speech (movements of the tongue and jaw, for instance) have no associative relationships with one another. Indeed, for muscular movements the next sounds in a sequence may be more important determinants of how the muscular apparatus will be arranged than preceding sounds (Hörmann 1971). Also, Salzinger et al.'s view of language as a Markov process meets problems because a sentence's meaning does not derive from summing the meanings of its constituent words, and, therefore, any model based on the stochastic relationship of single words is inadequate.

Even if neurologically possible (see Lashley 1951), a language model based on the associations between words would require an enormous amount of learning and would still never account for the infinite number of possible sentences. This does not mean that Salzinger et al.'s hypothesis is incorrect. On the contrary, it is in agreement with many attentional hypotheses. It suggests an underlying problem with schizophrenic cognition that could produce disordered speech, but it does not permit us to say that schizophrenics have a language competence deficit.

Communicability deficit in schizophrenia

The possibility that schizophrenic speakers violate the rules of communication has been noted by clinicians and experimenters (Bleuler 1950; Sullivan 1944). Much of the work on this hypothesis consists of word-frequency counts and type-token ratios. Although schizophrenics were found to differ from others on a number of dimensions (see Maher 1966 for a thorough review), this early work did not give rise to much theory, and modern workers have turned to other methods. An interesting line of research has been conducted by B. D. Cohen and his colleagues (see B. D. Cohen 1978 for a review). In their prototypical task, schizophrenics and nonschizophrenics are required to serve either as speakers or listeners. The speaker's task is to give a clue or clues that allow the listener to choose from a pair of stimuli the one designated by the experimenter as the "referent."

In one study, Cohen and Camhi (1967) found schizophrenics to perform poorly in the referential communication task when they played the speaker's role (that is, when they were giving clues) but to do as well as normal subjects when they were in the listener's role (receiving clues). In a later study by Nachmani and Cohen (1969), schizophrenics were compared with nonschizophrenics in memory for words using both a recognition and a recall test. Schizophrenics did approximately as well as nonschizophrenics when memory was tested by recognition but performed poorly when memory was tested by recall. Since recall requires memory retrieval and recognition does not (or at least it requires very little), these results suggest that schizophrenics have a problem in memory retrieval. Retrieval difficulties may also be responsible for schizophrenics' failure to retrieve helpful cues when playing the speaker's role.

Although not all the experiments in this field have yielded clear-cut results (Smith 1970, for example, failed to find a statistically significant difference between schizophrenics and normal subjects in the speaker's role), it would seem fair to conclude that schizophrenics do perform poorly in referential communication. On the basis of these data and additional evidence, Cohen, Nachmani, and Rosenberg (1974) have proposed a "perseverative-chaining" model of referential communication, which has as its basis the idea that schizophrenics sample each cue they generate from a "repertoire of associations to the immediately preceding response [cue] rather than the referent" (p. 11). According to this view, the schizophrenic is thought to say each cue aloud although he has already rejected it. He continues this process until a response "passes the probabilistic self-editing" stage, when he stops talking. Although this theory appears to account for schizophrenics' performance in the referential communication task studied by Cohen, it does not offer a comprehensive explanation for schizophrenic speech in general. For one thing, it is not clear how perseverative chaining is responsible for the incoherence produced by the schizophrenic speakers responsible for excerpts a and b, presented at the outset of the present paper. Undefined, ambiguous referents are at least as responsible as their incoherence. Nevertheless, Cohen's work, with its focus on discourse and the communicative function of speech, is certainly closer to naturalistic language than most laboratory research. His work suggests a problem for schizophrenics that may be in the realm of pragmatics – the rules for conducting conversations. This point is returned to later.

The competence of schizophrenics as communicators has been studied outside the laboratory by Rochester and her colleagues (Rochester 1978; Rochester et al. 1973), who analyzed free-speech samples. They found that schizophrenics judged "thought-disordered" (by raters, on the basis of the schizophrenics' speech) produced noun phrases with ambiguous and unclear referents more often than other schizophrenics or normal speakers. They also found a tendency to repeat phrases in adjacent clauses and to repeat (perseverate) at the end of clauses; this was particularly true among "thought-disordered" schizophrenics. It is little wonder that schizophrenic verbalizations are difficult to understand or to reconstruct (Rutter 1979), when they present so few links among sentences and referents. Unfortunately, normal adults and children may produce similar speech (Maratsos 1976). Moreover, despite extensive analyses, Rochester's observations of schizophrenic speech errors only account for 38 percent of judges' estimates of "thought disorder." Although most of the characteristics that make schizophrenic speech so uncommunicative remain unspecified, Rochester's work, like Cohen's, indicates a pragmatic and possibly a semantic deficit in schizophrenics.

Hypotheses based on the content of schizophrenic speech

Content analysis, as applied to schizophrenic language, is a way of making inferences about the mental organiza-

tion of schizophrenic speakers from their speech. A major contributor to this literature is Laffal (1965; 1979), who believes that "semantic structure is intact in schizophrenic individuals" (1979, p. 33) and that we could understand their "core conflicts" if we could make sense of their speech. Laffal's technique is to look for those instances in which key words occur in similar contexts. From these contexts, inferences are made about the meaning of these words for the subject. Laffal (1979) seems to be able to uncover the thematic context of confusing schizophrenic speech, but it is not certain that other content analysts (Forrest 1976; Gottschalk & Gleser 1964; 1969) would always agree with his interpretations. It is not clear how to decide which interpretation is correct, and, for our present purposes, it probably doesn't matter, because none of the content analysts has provided an explanation for why such analyses are necessary. That is, content analysis does not address the question of why schizophrenic speech is so difficult to understand in the first place.

Some researchers have gone beyond studying schizophrenic patients to look at the speech of their relatives. Singer and Wynne (1966), for instance, reported that the parents of schizophrenics produce more deviant speech than the parents of neurotics. This report received only weak support from studies by Hirsch and Leff (1975), who suggested that the parents of schizophrenics just talk more than others. Why they talk more and how parental speech produces incoherence in their children are not explained.

Pragmatic deficits in schizophrenia

Verbalizations such as those illustrated by speakers a and b at the beginning of this paper are difficult for listeners to understand. This difficulty is sometimes overcome after one has spent some time getting to "know" the patient (Bleuler 1950). This suggests that the schizophrenic speaker may be taking too much for granted, assuming the speaker knows enough about him to understand what he is trying to say. Cohen's work on communicability certainly supports the view that schizophrenics do not follow the accepted social rules for conversations. Similar views have been expressed by Cameron (1944) and more recently by Ostwald (1978).

Ostwald (1978; 1981) also describes peculiarities in schizophrenic speech production and nonverbal behavior. Speech may be too high or too low, noises may intrude, tone can be flat, articulation unclear, and pauses too long or too short. Inappropriate gestures, staring, facial grimaces – in fact, all nonverbal avenues of communication – may be disturbed in schizophrenia. Bleuler (1950) made similar observations about his patients.

Clinical observations and laboratory experiments appear to agree. Schizophrenics often violate the pragmatic rules regulating conversation.

Is schizophrenic speech the result of an information-processing deficit?

The notion that schizophrenic speech actually reflects some deeper and more general problem in processing information is not new. Many of the contributors to Kasanin's (1944) volume held such a view (although it was not expressed in so many words). Goldstein (1944), for instance, thought that schizophrenics lacked the "abstract attitude." Schizophrenic speech, he said, reflects this tendency toward "concrete" thinking. This hypothesis received a large amount of experimental attention in the 1950s and 1960s. Virtually all controlled studies failed to find any difference between schizophrenics and nonschizophrenics when the groups were matched for education (see Maher 1966 and Reed 1970 for reviews of this literature). Goldstein himself did not use controls and labeled as "concrete" subjects who did not perform the experimental task, those who disobeyed instructions, and those who were unable to give a clear account of their performance.

Von Domarus (1944), another contributor to Kasanin's volume, suggested that schizophrenic logic deviates from the formal laws of logic. Von Domarus's report gives almost no details about the experimental data on which his work was based; moreover, researchers have tended to interpret his ideas in different ways. After reviewing the relevant literature, Maher (1966) concluded that "the Von Domarus principle [schizophrenics are paralogicians] is unsupported by observations of the actual reasoning process of schizophrenics" (p. 429). Williams (1964) and Reed (1970) concur with Maher. Little work on the Von Domarus principle has appeared in the past decade.

A series of papers by Cameron (including one in Kasanin's book) described schizophrenic speech in some detail. An important problem, according to Cameron, is "overinclusion." Schizophrenics, he says, have trouble maintaining boundaries. They tend to include too many items in the same conceptual category, to overgeneralize, and to ignore specific differences. Payne and his colleagues have conducted a series of experiments demonstrating that schizophrenics are overinclusive in a variety of circumstances (see Payne 1966 for a review). Overinclusion is more or less the opposite of Goldstein's "concreteness," and its experimental support is far stronger (see Reed 1970). Overinclusion appears to be closely related to the "distraction" theories favored by many experimenters today (Neale & Oltmanns 1980). If schizophrenics are easily distracted, they should respond to many stimuli, overgeneralize, and so on. It's worth noting that overinclusion is not specific to schizophrenics. Payne and Hirst (1957) report overinclusive thinking in depressives; Payne and Friedlander (1962) found overinclusive thinking in neurotics.

Several experimenters whose work has already been reviewed also see schizophrenic language as the result of a more general deficit in processing information. Salzinger et al. (1978) saw the problem as arising out of schizophrenics' responsiveness to immediate stimuli. Others have alluded to general response biases (Chapman & Chapman 1973) or to response interference (Broen & Storms 1967). More recently, researchers have turned their attention to memory deficits and attentional dysfunctions.

Although most memory research has focused on short-term memory, at least one study had as its concern the storage structure of schizophrenics' long-term memory (Koh, Kayton & Schwarz 1974). Schizophrenic patients, nonschizophrenic patients, and nonpatients were re-

quired to sort a deck of cards, each card bearing a common word, into piles on the basis of perceived similarity. Although overinclusion has long been thought to characterize schizophrenics (see Cameron 1944), cluster analyses revealed that the structure of each group's card sorts was similar. This was true even under time pressure. Clearly, this finding is in accord with the evidence (reviewed earlier) that schizophrenics do not have strange word association repertoires.

The possibility that the schizophrenic deficit may lie in short-term memory has received considerable attention. Although some researchers have postulated a smaller short-term memory capacity for schizophrenics, there is little evidence for this position (see Koh 1978, for a review). It is much more likely that schizophrenics have a problem with the cognitive processes used to enter and manipulate information in working memory.

In recent years, much effort has been devoted to the problem of selective attention in schizophrenia; the ability to attend selectively to aspects of the environment is essential for language learning and performance. Much of the work in this area has been performed by Neale and his colleagues (see Neale & Oltmanns 1980 for a review) using visual stimuli. Although this research is probably less relevant to language than studies of auditory attention, it is worthwhile noting that these studies do not clearly identify a specific schizophrenic information-processing deficit. Rather, they have been interpreted (see Davidson & Neale 1974, for example) as indicating that the information-processing operations of both schizophrenics and nonschizophrenics are similar, although the schizophrenics may perform them at a slower rate.

Schizophrenics' auditory selective attention has been studied extensively with dichotic listening tasks in which words or other stimuli are presented to the two ears, and subjects are asked to shadow some of the stimuli while ignoring the rest (Friedrich, Emery & Fuller 1974; Payne, Hochberg & Hawks 1970; Wishner & Wahl 1974). In general, schizophrenics omit more shadowed words and recall fewer of the shadowed words than nonschizophrenic patients or normal individuals. They also recall fewer of the shadowed words on subsequent recall tests. Moreover, schizophrenics are much more likely to make intrusion errors (saying or recalling a word that they were instructed to ignore), particularly when presentation is fast. The dichotic listening studies have been taken to indicate that slow information processing and defective filtering are the two most important determinants of the schizophrenics' performance. The conclusions of other experimenters (Friedrich et al. 1974, for instance) are similar. A problem in "filtering out" unwanted information was also suggested by Reed (1970) and fits in with findings on overinclusion mentioned earlier. There are several meanings to the term "filtering," however, and these must be clearly understood if we are to characterize the schizophrenic deficit accurately.

Broadbent (1958) used the term "filtering" to characterize a "stimulus set" in which the stimuli of interest can be differentiated from unimportant stimuli on the basis of a common physical feature (for example, acoustic similarity or color). More recently, Broadbent (1971) has introduced an additional attentional mechanism, "pigeonholing." Pigeonholing occurs when one adopts a "response set," selecting from a large number of items (for example, a list of words), those constituting a subvocabulary (for example, articles of furniture). The distinction, then, is that filtering leads to stimulus selectivity, whereas pigeonholing results in response selection. Much of the work on attention in schizophrenia (see Hemsley 1975) has confused filtering with pigeonholing. For example, although Wishner and Wahl (1974) interpret their results as supporting the hypothesis that schizophrenics are deficient in filtering, it appears that in their study, schizophrenics were deficient in pigeonholing. That is, both schizophrenics and nonschizophrenics attended to the shadowed as well as the nonshadowed words (as evidenced by the results of their subsequent recall and recognition tests). The nonschizophrenics, however, rarely gave these nonshadowed words as responses, whereas the schizophrenics often did.

The importance of the filtering/pigeonholing distinction is dramatically demonstrated by two recently reported shadowing experiments. Pogue-Geile and Oltmanns (1980) asked schizophrenic and control (nonschizophrenic patients and nonpatients) subjects to shadow (repeat) messages going to a particular ear while ignoring whatever was heard in the other ear (a distractor message or silence). The shadowing performance of all groups was equivalent and not affected by distraction. In our present terms, this was a "filtering" experiment. Attention had to be allocated on the basis of a physical factor – ear of entry. Compare these results with those reported by Hemsley and Richardson (1980). In their experiment, two messages using the same voice were presented simultaneously to both ears. The subjects (schizophrenics, nonschizophrenics, and nonpatients) were required to shadow one of the messages. In this experiment, attention could not be allocated on the basis of a physical cue. Instead, attention had to be allocated on the basis of the meaning of the target message – a process we have labeled pigeonholing. Hemsley and Richardson found schizophrenics inferior to control subjects on this task. Not only do the findings of these two studies underline the necessity for distinguishing between filtering and pigeonholing; they also suggest that schizophrenics have difficulty only with the latter.

Evidence in favor of the pigeonholing hypothesis also comes from memory-encoding studies. Most of the work on the encoding of information by schizophrenics has been performed by Koh and his associates and is described in detail by Koh (1978). Some methodological problems with this work are discussed by Schwartz (1978b). An experiment with important implications for the pigeonholing hypothesis was reported by Koh, Kayton, and Berry (1973). They found that schizophrenics and nonschizophrenics do not differ in their ability to recognize previously presented words. This common finding suggests that a problem in recall or retrieval strategy (perhaps attributable to poor organization) is responsible for the schizophrenic memory deficit. These investigators went on to analyze their results using signal-detection statistics and found that schizophrenics and nonschizophrenics did not differ in their respective sensitivities (d') to the originally presented words. This finding is relevant to the filtering/pigeonholing distinction because Broadbent (1971) has related changes in d' to filtering, whereas pigeonholing is related to the bias parameter, β. Koh et al.'s finding that schizophrenics do

not differ from nonschizophrenics in d' indicates that the schizophrenic deficit is not in filtering but in some more central form of attentional allocation.

The relation between pigeonholing and speech is problematic, but it is possible that defective pigeonholing is responsible for at least some of the peculiarities of schizophrenic speech. For example, defective pigeonholing may be responsible for Chapman and Chapman's (1973) "response bias" observation, overinclusive speech, and even perserveration. A pigeonholing deficit may also be responsible for schizophrenics' tendency to rely on shallow levels of encoding (Rochester & Martin 1979).

Is there a schizophrenic language?

Schizophrenics are sometimes difficult to understand. So are nonschizophrenic patients, poets, and even "normals," but perhaps not quite so often (see Reed 1970 for a comparison of poets and schizophrenics). Although virtually all observers agree that schizophrenics sometimes say bizarre things, it has not been clearly demonstrated that their problem is the result of a language deficit. They appear to use syntactic rules appropriately (the evidence with regard to semantic rules is unclear), they do not have peculiar word association hierarchies, and their speech errors are similar to those made by nonschizophrenics.

Schizophrenics often ignore the pragmatic rules underlying conversations. They may fail to provide sufficient context for their listeners; they may also talk in a strange voice, grimace, or gesture inappropriately. Naturally, all this makes them hard to follow, but it does not reflect on their language competence – only on their performance. Schizophrenics' speech is disturbed, but their language competence appears intact.

Schizophrenics are easily distracted, somewhat biased toward the strong meaning of words, and sensitive to only a limited amount of verbal context. It is plausible that lying at the basis of these problems is a central defect in pigeonholing (adopting a response set). Thus, when a task can be performed merely on the basis of filtering (picking out a red disc from those of several colors or recognizing a word from a list of several previously presented words), schizophrenics perform about as well as normal subjects, but when a task requires pigeonholing (putting words into semantically related categories or shadowing only words on a particular theme), schizophrenics perform poorly.

Future research may reveal how this information-processing deficit produces the peculiar language associated with schizophrenia. A start has been made by Knight and Sims-Knight (1979) who found that some schizophrenics fail to integrate ideas from simple sentences into more complex sentences. Their testing procedure required that subjects judge whether or not test sentences were seen earlier. Schizophrenics could distinguish between totally irrelevant sentences and those encountered earlier about as well as nonschizophrenics. Schizophrenics also appeared to have little trouble recognizing sentences that they had actually encountered earlier. Some schizophrenics, however, judged complex sentences made up of the ideas conveyed originally by several simple sentences as "new," whereas nonschizophrenics *misjudged* these sentences as old.

Since schizophrenics had little trouble discriminating irrelevant sentences from those they actually saw earlier, it is clear they have no "filtering" problem. On the other hand, their failure to judge sentences that integrate ideas as "old" suggests that they did not alter their "response biases" on the basis of linguistic information – a problem in pigeonholing.

With more research we may be able to characterize completely the deficit responsible for schizophrenic speech. We may never be able to explain the schizophrenic language deficit because it probably doesn't exist.

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There *may be* a "schizophrenic language"

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Schwartz is to be complimented for making a group of useful distinctions that are necessary in order to dissect and identify the various abnormalities that may underlie or characterize anomalies in the speech of some schizophrenic patients. He is also to be complimented for a comprehensive (almost) review of recent literature in the area (Andreasen 1979a; 1979b) and for providing a thoughtful critique of it. I share much of his consternation about imprecise or tautological definitions and poorly conceived methods. The "stout Cortez" who surveys recent literature in this area is indeed more likely to feel grim dismay than "wild surmise." On the other hand, the field is intrinsically difficult, and therefore hard to study well. After all, one is sampling an ocean rather than a pond, and it is small wonder that investigators have sometimes been confused about which ocean they are surveying.

In spite of my overall agreement with many of Schwartz's theses, some areas of disagreement also exist. In this review Schwartz concludes that "we may never be able to explain the schizophrenic language deficit because it probably doesn't exist." This conclusion may be erroneous for several reasons.

In addition to the many useful distinctions that Schwartz makes, another important and useful distinction should be made between input and output, or language perception and processing versus language production. Most of the research completed to date suggests that schizophrenics are, indeed, competent in perception and processing. On the other hand, they may not be competent in the area of language production. We have just

completed a comprehensive series of studies in which we have attempted to map abnormalities in various aspects of language, including syntax, semantics, pragmatics, and discourse in a sample of 50 schizophrenics, 25 schizoaffectives, and 25 manics. The results of this study, most of which are not yet published (Andreasen 1982), support the finding of abnormalities in production, specifically in semantics, pragmatics, and discourse. The work of Rochester and Martin (1979) also supports this conclusion.

Part of the disagreement may be definitional. It is unclear to me why Schwartz considers defects in the pragmatic aspects of language to represent a deficit in performance rather than competence, or in speech rather than language. Many psycholinguists consider pragmatics and discourse to be aspects of language. Depending on how one views the world, defects in pragmatic (or discourse) aspects of language *are* deficits in language (as opposed to speech) and *may* reflect a deficit in competence (as opposed to performance).

The DSM-III criteria for schizophrenia (American Psychiatric Association 1980) are probably not as tautological as Schwartz implies. Six symptomatic criteria are listed for schizophrenia in DSM-III. Five of the six involve delusions or hallucinations. The sixth criterion, as Schwartz indicates, refers to various forms of disorganized speech when accompanied by other necessary symptoms. A patient need only have one of these six symptoms for a diagnosis of schizophrenia to be made. Disorganized speech need not be present, and indeed in most clinical practice it is used for making a diagnosis of schizophrenia much less often than are delusions or hallucinations.

I concur with Schwartz that much work remains to be done in this area before we can reach any valid conclusions. For the purposes of argument, however, I should like to submit that there *may be* a "schizophrenic language" that can be characterized as follows:

1. Schizophrenics are able to perceive and process language normally, at least in terms of its syntactic and semantic aspects, and probably in terms of its pragmatic and discourse aspects (Carpenter 1976; Knight & Sims-Knight 1979; Rochester, Harris & Seeman 1973).

2. Schizophrenics do show definite deficits in language production, occasionally in semantic aspects and more often in pragmatic and discourse aspects (Andreasen 1979a; 1979b; 1982).

3. These deficits do not represent a *specific* "schizophrenic language" in the sense that they occur only in patients suffering from schizophrenia. Similar deficits do appear in patients with other "functional psychoses" such as mania (Andreasen 1979a; 1979b; 1982). They also occur in patients suffering from dementia.

4. These deficits occur only in a subset of schizophrenic patients, not in all (Andreasen 1979a; 1979b; 1982).

5. The language of this subset of schizophrenic patients does differ from that of manics in that the abnormalities appear to be less reversible when the patients are followed longitudinally. When manic patients recover from their affective illness, most produce language that does not differ significantly from that of normal individuals. On the other hand, longitudinal follow-up of schizophrenic patients in our laboratory indicates that language abnormalities persist in many of these patients even after extensive treatment and after discharge from the hospital (Andreasen 1982). Thus, the deficit may be specific to schizophrenia (as compared with mania) in that it is irreversible. On the other hand, it probably would not appear to be specific if schizophrenic patients were compared to those suffering from dementia, who also tend to have irreversible language abnormalities.

Research in the area of schizophrenic language has too often been preoccupied with definitional issues, single case studies, and "black box" paradigms. We need more careful and thoughtful studies conducted longitudinally on larger samples of patients classified according to a variety of diagnoses. The emphasis in the studies should be on designs that may illuminate the underlying mechanisms of the disorder, particularly the functional brain systems that may be involved. In this sense, the aphasias may serve as a useful model.

Schizophrenic thought disorder: Linguistic incompetence or information-processing impairment?

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Much of the evidence for Schwartz's conclusion that schizophrenic thought disorder is not attributable to linguistic incompetence consists of findings that suggest that: (1) when studies are properly conducted schizophrenics are shown to have adequate language, and (2) impaired language is found in other psychiatric disorders. Another set of data that can help clarify the relation between thought disorder and language competence comes from studies of the temporal relation between the onset of thought disorder and the presence of problems of linguistic competence. If schizophrenic thought disorder is caused by language impairments, those impairments should antedate episodes of thought disorder. Since most schizophrenic individuals experience multiple episodes of thought disorder, one strategy for determining whether language incompetence antedates episodes of thought disorder is to study schizophrenic individuals between episodes – during the postpsychotic stages of the disorder. This research strategy reflects a widely held belief that "fundamental" aspects of schizophrenia should be present across the course of the disorder. This belief can be traced back to Bleuler's (1950, p. 13) assertion that "certain symptoms of schizophrenia are present in every case and in every period of the illness."

Studies of schizophrenics during the postpsychotic stages of disorder reveal that many aspects of language impairment in schizophrenia are transient disruptions associated merely with the presence of acute psychopathology. For example, in a one-year follow-up of chronic schizophrenics, Flekkøy, Astrup, and Hartmann (1969) found that performance on a word association measure of associative intrusions had been normalized relative to the initial admission to the hospital. These trends held up at a 16-year follow-up, leading Flekkøy (1975) to conclude that normalization of language occurs relatively soon after the initial admission. Similar results were obtained by Siegel, Harrow, Reilly, and Tucker (1976), who scored loose associations from the free verbalizations obtained in an interview of chronic, partially recovered schizophrenics. They found a low frequency of loose associations and suggested that looseness of association appears to be associated primarily with the acute stage of schizophrenia. Associative interference (the intrusion of preestablished associations) was found by Spence and Lair (1965) to be characteristic of actively disturbed schizophrenics and was not seen in even partially recovered chronic patients. The fact that impairment in the acquisition of new verbal associations is found primarily during the acute stages of schizophrenia is consistent with the well-known phenomenon of intense anxiety interfering with the acquisition of complex responses (Mandler & Watson 1966; Spence & Spence 1966). A number of other

transient conditions such as prior set approaching the task, perceptual dysfunction, and speed of responding, all appear to contribute to producing deviant responses on a word association test (O'Brian & Weingartner 1970). Many of these factors can readily be seen in schizophrenic patients taking a word association test for the first time in the midst of an acute disturbance. In sum, studies of schizophrenic language during the postpsychotic stages of the disorder do not support the contention that schizophrenics have *stable* linguistic competence deficits. These data are consistent with Schwartz's conclusion that a linguistic competence problem is not a central aspect of schizophrenia.

In contrast, studies of information processing during the postpsychotic stages in children at risk for schizophrenia have revealed impairments that appear stable across wide variations in clinical state. Cross-sectional studies of partially recovered schizophrenics reveal impairments on tasks like the span of apprehension (Asarnow & MacCrimmon 1978). A subsequent study (Asarnow & MacCrimmon 1981) replicated and extended these findings, showing that a sample of partially recovered schizophrenics was impaired on this task and differed from a group of partially recovered manic-depressive patients. A recently completed longitudinal study (Asarnow & MacCrimmon 1982) replicated these results obtained from cross-sectional studies by finding persistent information-processing impairment even as there were significant deteriorations of general clinical state, and specific aspects of schizophrenic thought disorder, including associative intrusions and deviant word associations. Wohlberg and Kornetsky (1973) and Asarnow and MacCrimmon (1978) found that another information-processing task, the continuous performance test, is also sensitive to dysfunction in partially recovered schizophrenics.

Converging evidence that impairment of information processing in schizophrenic patients is not merely a reflection of acute psychopathology is also provided by studies of children at risk for schizophrenia who, by definition, have not yet manifested overt thought disorder. Children at risk in virtue of having a schizophrenic biological parent show impairment on a number of information-processing tasks, including the span of apprehension (Asarnow, Steffey, MacCrimmon & Cleghorn 1977) and versions of the continuous performance test (Cornblatt & Erlenmeyer-Kimling, in press; Erlenmeyer-Kimling & Cornblatt 1978; Nuechterlein 1982b). The fact that deficits in information processing occur both prior to the development of and after substantial reductions in thought disorder is consistent with Schwartz's conclusion that impaired information processing may underlie some aspects of schizophrenic thought disorder.

Schwartz notes that there are a number of instances in which schizophrenics' speech appears to be normalized. Specification of these "normalizing" conditions directs our attention to the specific aspects of linguistic performance that must be accounted for by any information-processing model of schizophrenia. When prompted to use clustering strategies, schizophrenics have been found to show improved performance on tests of short-term verbal memory (Koh 1978). Meichenbaum and Cameron (1973) found that when schizophrenics are provided brief training in verbal mediation to encourage monitoring and evaluation of the quality of their performance, they make fewer deviant verbalizations during a standardized interview, and show improved perceptual integration and abstract reasoning. These findings suggest that when schizophrenics are provided with general problem-solving strategies that are task appropriate, or are prompted to use strategies already in their repertoire, their performance is greatly enhanced. This pattern of performance is quite similar to the description in the literature on cognitive development of a "production deficiency."

A production deficiency is defined as: (1) a failure to produce appropriate mediators *spontaneously;* (2) a tendency to show enhanced performance when the appropriate mediators are induced; and (3) a tendency to abandon the mediational strategy when the external demand for strategy production is removed even though the use of the strategy had enhanced performance (Keeney, Cannizzo & Flavell 1967). We are not suggesting that schizophrenics show "maturational lags." The similarities between some aspects of schizophrenic performance and a "production" deficiency do highlight the impairments in the way schizophrenics use language or verbal mediation *instrumentally* to organize and integrate their own behavior. Vygotsky (1962) and Luria (1961) have emphasized the role that speech and language play in the development of self-regulated behavior. In the Soviet view, private speech guides and controls access to other cognitive structures. It has an executive regulatory function in the planning, organization, integration, and monitoring of behavior. It may be precisely in this other "pragmatic" aspect of language function – in the way language is used to regulate behavior – that important clues to the enigma of schizophrenic thought disorder may lie.

The nexus, then, of both the information-processing impairment and the speech disturbance in schizophrenia may involve failure of systems initially acquired through verbal mediation and involved in the planning, integration, and monitoring of behavior. This hypothesis is consistent with recent views (Asarnow & Asarnow, in press; Neale & Oltmanns 1980) that it is at the level of controlled information processing that schizophrenics encounter their major difficulties. If this hypothesis is correct, it would have profound implications for attempts to construct neurobehavioral models of schizophrenia, for it is by successively circumscribing (Asarnow, in press) the nature of functional impairment that progress toward understanding the psychobiological substrates of the schizophrenias is made.

Is there a schizophrenic condition?

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Studies of a population diagnosed as "schizophrenic" and any review interpreting the meaning of such studies face a question. Is the concept of "schizophrenia" logically viable for research purposes? Schwartz accepts "schizophrenia" as a viable concept for research purposes on the grounds that the diagnosis has a moderate degree of interjudge reliability. In psychiatric practice, schizophrenia is a *disjunctive* category (Bannister 1968). Thus, if we assume, say, five major defining characteristics for schizophrenia (e.g. the traditional thought disorder, primary delusions, loss of volition, incongruity or flattening of affect, and disturbances of motility) then people may be included in the category because they manifest some (but, since the category is used disjunctively, not necessarily all) of these characteristics. We may therefore diagnose some people as schizophrenic because they manifest characteristics A and B and others as schizophrenic because they manifest characteristics C, D, and E. The two groups are now firmly placed in the same category while not specifically manifesting *any* common characteristic at this level of abstraction. It can be argued that disjunctive categories are logically too primitive for scientific purposes, and certainly the procedure outlined means that we can have a fair degree of interjudge reliability about who is to be designated "schizophrenic" while the category remains highly heterogeneous in its content. The penalty of trying to use such a disjunctive concept is manifest in Schwartz's review in that "saying odd things," "schizophrenia," and "thought disorder" are used as more or less interchangeable concepts, when in practice only a limited percentage of schizophrenics are ever judged "thought disordered," and these on the grounds that they manifest disorders of "form" rather than disorders of "content." Clinical psychiatry traditionally distinguishes be-

tween delusional talk (disorders of content) and the presence of vagueness, inconsequentiality, clang associations, thought blocking, and so forth, which are designated disorders of form. Schwartz cites Rochester (1978) who makes the distinction between thought-disordered and non–thought-disordered schizophrenics, but he fails to take her point.

We can take this argument in its strong form and accept (Agnew & Bannister 1973) that the language of diagnostic psychiatry is a pseudo–specialist language which can be experimentally shown to be less structured, consistent, and communal than lay language; or we can at least suspect that many of the contradictory results detected by Schwartz are less a product of methodological and theoretical inconsistency and more an outcome of the ambiguity of the target population.

Putting aside this kind of root and branch objection, Schwartz's review poses a problem in its reliance on a distinction between language and speech. Clearly the distinction can be made at a *social* level. We can talk about the general characteristics of language and the particular characteristics of a specific person's speech. However, when it comes down to distinguishing *within single individuals* between their "language" and their "speech," difficulties arise, because defects in either will lead to defective output. If my "language" is competent but the content of what I want to say is strange then you will find my speech output confusing. If what I want to say is conventional but my language is malformed then you will find my speech output confusing. To make the distinction work we need operational measures that effectively distinguish between the two.

In relation to this problem Schwartz adversely criticises studies for "their tendency to reduce language to what may be studied in the laboratory," but he concludes, "Nevertheless, taken together, they seem to suggest that schizophrenics do have the ability to use at least syntactic if not semantic and pragmatic rules in experiments of this sort." This hopeful conclusion hardly amounts to the kind of clear theoretical and operational distinction between language and speech which would be required to justify Schwartz's concluding statement that "with more research we may be able to characterize completely the deficit responsible for schizophrenic speech. We may never be able to explain the schizophrenic language deficit because it probably doesn't exist."

Outside the experimental laboratory there are grounds for favouring Schwartz's proposition that we should not reduce the oddity of the schizophrenic to an oddity of language. First, language is part of life, and if you persist in "saying odd things" people will react oddly to you, your relationships and roles may be distorted, and the experience may cause you to say even odder things. More important, the group on which Schwartz's cited researches focus are not primarily defined by the oddity of their language but by the oddity of their life. They usually arrive within the category schizophrenic (and institutions for schizophrenics) because they have done odd things rather than simply because they have said odd things, and again, life being a process, their life often becomes odder still once we have reacted linguistically to them by calling them "schizophrenic." So perhaps the mystery of the odd things schizophrenics say is not to be solved simply by focussing on what they say, any more than (as linguistic experimenters admit) the meaning of a word can be understood without looking at the sentence, or indeed the sentence without looking at the paragraph. Not included in the many astute and thoughtful criticisms Schwartz makes of the researches he reviews, is the criticism that they are all within a tradition that is too ad hoc, too specific to traditional topic areas. What is needed is research based on a general theory of the nature of human functioning: general not only in seeing all human experience and action as integral but in picturing "normal" before trying to explain "abnormal." Even at the level of the studies reviewed we know so little about the general nature of language and speech that we are unlikely to be able to explain "odd" speech.

Attempts to deal with Schwartz's area of concern in terms of total psychology range from Sechehaye (1951) with Freudian theory to Bannister, Adams-Webber, Penn, and Radley (1975) within the premises of personal construct theory (Kelly 1955). Such attempts appear overly ambitious, if not grandiose, on first inspection, but in the long run they may prove less ambitious than the (literally) thousands of experiments made over a period of 70 years that seek to make sense out of schizophrenic speech by constructing minitheories and ad hoc methods to that end.

Inconstancy of schizophrenic language and symptoms

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Concerning Schwartz's interesting discussion I have one suggestion: It is an old clinical observation that schizophrenic language (just like schizophrenic thinking and behavior) is not stable. In many patients it undergoes astonishing changes. One patient may speak in a very dissociated way that is difficult to understand, but the same patient may write letters as good as those of a healthy person. Another schizophrenic may speak in a clear and coherent way to me but in a very incoherent and peculiar way to his relatives. Another patient may not have uttered so much as an understandable phrase for several weeks but may suddenly give me in a coherent way (just as if he were healthy) the reasons for his wish to be discharged from the hospital. It might be interesting to include the inconstancy of formal schizophrenic language of the same patient in the discussion of schizophrenic language.

The inconstancy of schizophrenic symptoms is hard to observe if one only deals with schizophrenics for a restricted number of hours during psychopathological research. It is easy to observe, however, when one lives under the same roof with schizophrenics for decades.

A neurologist looks at "schizophasia"

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Earlier researchers had expressed the hope that analysis of schizophrenic speech ("schizophasia") would throw valuable light on the nature of schizophrenia itself: "Might the secret of schizophrenia lie in a hitherto unknown high-level aphasic disturbance?" asked Rümke and Nijam (1958, p. 623). On the whole, however, this approach has not been a very fruitful one, probably because "schizophasia" is not primarily a disorder of language.

Schwartz is correct in stressing the importance of the conceptual distinction between speech, language, and thought but may have confused some readers by illustrating this distinction with examples derived from the work of de Saussure (1915) and his French terminology. In current neurolinguistic research and in neurological clinical practice, speech refers to the neuromechanical process of articulation. Language is more difficult to define but usually refers to the various processes involved in communication. These include perception of auditory or visual stimuli, integration of these stimuli with prior knowledge, and activation of appropriate response mechanisms. Thought is even more difficult to define but many researchers have discussed in detail the separation of language and thoughts (e.g. Binet 1903; Critchley 1970; Vygotsky 1962). Despite these problems of

conceptualization and precise definition, it is useful for neurologists and neurolinguists to separate clearly disorders of speech, disorders of language, and disorders of thought because they have different clinical manifestations, and because they involve different pathogenic mechanisms, different prognoses, and different therapeutic approaches.

Speech disorders can be of either organic or psychogenic origin and include stuttering, palilalia, and mutism. Disorders of language are synonymous with aphasia and are, by definition, secondary to cerebral lesions. Disorders of thought, on the other hand, can also be either organic or psychogenic; they include such conditions as dementia, depression, and mania as well as schizophrenia. The topic has been recently reviewed by, among others, Critchley (1964) and Benson (1975).

Even though there may be overlap between these different types of disorders, they are known to occur in isolation. For example, some patients with a severe speech disorder have been shown to have intact processing of verbal material (Nebes 1975). Starting with the work of Marie (1906), there has been considerable controversy about whether aphasic patients have an impairment of intelligence (see Basso, De Renzi, Faglioni, Scotti & Spinnler 1973 and Lebrun & Hoops 1974 for recent discussion of this problem). As pointed out by Ombredane (1951), it is clear that at least some asphasic patients retain normal thought processes and are not demented. On the other hand, the great majority of workers who have studied "schizophasia" have found that schizophrenic patients do not generally demonstrate aphasic features in their language (e.g. DiSimoni, Darley & Aronson 1977; Fromkin 1975; Kelter, Cohen, Engel, List & Strohner 1977). One exception to this rule may be the so-called schizophrenic word salad (Bleuler 1950), which is characterized by neologism and jargon and therefore bears some resemblance to aphasia. As pointed out by Benson (1975), this disorder is rarely observed in current practice and often represents a fluent paraphasic aphasia which is in turn secondary to a specific brain lesion.

These considerations reinforce and perhaps put a different perspective on Schwartz's conclusions. The language of schizophrenic patients is often abnormal in its content and reflects the abnormal thinking that characterizes schizophrenia. It is the expression of a disorder of thoughts and is not a disorder of language.

Can listeners draw implicatures from schizophrenics?

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In his paper, Schwartz failed to mention perhaps one of the most fruitful approaches to the analysis of schizophrenic discourse – the conversational implicature of H. P. Grice (1975). At several junctures, however, Schwartz does suggest that the schizophrenic's disruption is likely to involve the socially accepted rules for conducting conversation and that therefore the problem resides in the realm of pragmatics. Nowhere, however, does he provide any detailed guidelines; nor does he refer to any of the literature on implicature. In my commentary I would like to suggest that Grice's ideas be incorporated into the analysis of extended schizophrenic spoken texts.

Societal norms are such that people expect each other to be cooperative in most spheres of transaction – especially when speaking with one another. The logic of conversation demands this cooperative principle, to which, according to Grice, there are four maxims attached. The first is the maxim of Quantity, which has two parts to it. One's contribution should be as informative as the current purposes of the conversation require. The converse is that the speaker should not make the contribution more informative than existing purposes call for.

The second Gricean maxim, that of Quality, also has two sides. One requires that speakers not say what they believe to be false, while the other stipulates that speakers should not say that for which they lack adequate evidence. The third maxim is the maxim of Relation. That is, make your contribution relevant to the topic at hand.

The fourth maxim, referred to as the maxim of Manner, requires that speakers be perspicuous. They should avoid obscurity and ambiguity, while being brief and orderly. Speakers should avoid unnecessary prolixity. A crucial facet of Grice's maxim of Manner involves ambiguity. Herbert Clark and Susan Haviland (1977) have attributed the full status of a maxim to ambiguity. Their maxim of Antecedence dictates that speakers must try to construct utterances such that the listeners have only one direct antecedent for any given piece of information. Furthermore, it must be the intended antecedent.

Intimately connected with principles of antecedence in discourse is the notion of given information. In a real sense, given information is antecedent information, and without it hearers will lose the thread of conversation. There are two types of information contained in utterances – given and new. In general, the given information is provided early in sentences, while the new is provided later. New information is most often signaled by a preceding indefinite article (I saw *a* man), or it is syntactically marked in a cleft sentence (It was *a* man whom I saw). Once *man* is established as given, it may follow the definite article (*The* man I saw was your brother). Surface structure subjects virtually always contain the given information. This tendency appears to be universal across many language groups (Clark & Clark 1977, p. 548).

In order to comprehend, listeners must be able to isolate given and new information in some current utterance. They must then search their memory for a direct antecedent – some structure whose propositions match the given information exactly. The listener may then, and only then, integrate the new information into memory structure by attaching it to the antecedent just located. On analogy with computerese, the given information indicates the "address" in memory to which the new information is affixed. A universal constraint upon comprehension strategies of hearers would require that they initially locate the antecedent in memory before attaching new information to it. The most straightforward way to go about the task, therefore, would be to take in given material before new material. Were new information provided initially, the hearer would be obliged to hold it in short-term memory while searching for the address to which it is to be attached. This explains why most languages of the world order surface sentential subjects first and why those subjects normally carry the given information. Obviously, then, if speakers do not abide by the maxim of Antecedence, hearers will have increased difficulty following the conversation.

There is another significant feature of the given–new principle. Given information (as antecedent information) may be supplied initially (as new) from within what is called an "anaphoric island" (Haviland & Clark 1974), but no pronoun may refer to it. That is, I may say *She opened the picnic basket, but the beer was warm*, and hearers will immediately appreciate *beer* as given information contained in the anaphoric island *picnic basket*. However, *beer* cannot serve as a linguistic antecedent for a pronoun. Hence, for the sentence *She opened the picnic basket, but it was warm, it* can only refer to the picnic basket. Quite clearly, then, if speakers do not adhere to this constraint, listeners will misunderstand a great deal of what is said to them.

There are four ways in which a speaker may fail to fulfill a maxim. The first three involve the collapse of the cooperative principle. First, a speaker may clearly violate a maxim with the express purpose of misleading the hearer. Furthermore, speak-

ers may opt to forgo the cooperative principle by simply proclaiming to the hearer that they are not willing to adhere to the requirements of the maxim. Third, there may be a clash between maxims whereby one may not be fulfilled without violating another in some way.

The fourth and most interesting way in which a maxim may fail to obtain is by being "flouted" – in the sense of being disregarded. This is the most common way for a maxim to fail; the cooperative principle is still in force, and the hearer can in general draw the implicature (i.e. make the inference). Given that the cooperative principle is in effect, hearers have a minor problem when confronted with flouted maxims, since speakers should be saying what they mean. The minor problem is resolved, however, by the generation of the conversational implicature.

Flouting the maxim of Quantity by providing a prospective department chairman with extra detail (uncalled for) on how good a candidate's teaching is will often allow the chairman to draw the implication that the candidate does not publish much. The maxim of Quality is flouted with irony (sarcasm), metaphor, understatement (meiosis), and exaggeration (hyperbole), but most hearers can easily draw the inferences. In order to prevent a social blunder, the hearer may (upon responding to the speaker) flout the maxim of Relation by abruptly changing a potentially embarrassing topic of conversation to something totally different when an unwanted third party approaches. The hearer usually infers that it is best not to pursue the topic and is not puzzled by the irrelevant utterance. The maxim of Manner can be flouted when, for example, new information is introduced first in an utterance and preceded by a definite article. When this maxim is flouted, hearers will infer that the new information is crucial and that they had better concentrate on it. As a ploy in writing novels and short stories, flouting in this manner will quickly draw the reader into the story – probably because of enhanced awareness that there is some as yet unrevealed address in the mind of the writer. These, then, are some of the ways normal speakers may fail to fulfill maxims. The question now becomes, How could schizophrenics fail them?

The only studies I am aware of that make any attempt at all in this direction are those by Hoffman, Kirstein, Stopek, and Cicchetti (1982), Rochester, Martin, and Thurston (1977), and Rochester and Martin (1977). Hoffman et al. (1982) refer to Grice's work, but for some reason they focus exclusively on the maxim of Relation – often miscategorizing other maxims. For instance, they discuss indefinite reference in schizophrenic speech but fail to tie this in with the Gricean maxim of Manner. The following is from a 41-year-old chronic schizophrenic male patient of Hoffman et al. (1982, p. 228):

Interviewer: Tell me some of your thoughts about school.
Patient: I hate school. You wanna know why? I threw a spitball and she made me swallow it.

Note that the patient pronominalized from an anaphoric island. *She* cannot refer back to an antecedent, presumably "teacher," for the same reason that *it* could not refer to "beer" in the example discussed earlier. Had the patient uttered "and *the* teacher made me," the hearer could have easily inferred that "the teacher" was given information, and that the antecedent was implied as part of the material in the anaphoric island *school*. We need more research into how often schizophrenics use pronouns whose antecedents reside in anaphoric islands. In any event, here is a clear demonstration of how a schizophrenic fails to fulfill the maxim of Manner.

Indefinite reference has also been analyzed in the speech of schizophrenics by Rochester et al. (1977) and Rochester and Martin (1977). The question that must ultimately be answered in all the work on indefinite reference is whether the schizophrenics' failures with the maxim of Manner as regards the principle of antecedence are actually pragmatic or, rather, adumbrate retrieval problems. This is a crucial distinction, because it can be shown that Wernicke's aphasics and anomic aphasics, both of whom exhibit severe word-finding difficulties, produce a plethora of indefinite anaphora (Buckingham & Kertesz 1976, p. 94). In other words, do schizophrenics fail to provide linguistic antecedents for pronouns because they cannot retrieve them from their lexicons, or do they break discourse principles of antecedence by using pro forms whose antecedents are simply not clearly provided? Schizophrenia would only be aphasiclike in the first case. The interpretive problem is, however, that the surface linguistic behavior would be identical for both populations. In any event, it is clear that aphasics have lexical retrieval blocks, but it is not so clear that schizophrenics do.

Yet another identical marker of Wernicke's aphasics and schizophrenics is their remarkable ability to produce anaphoric forms whose antecedents are not linguistically specified in discourse but rather are present in the explicit situational context. For example, a dog enters a room where two people are talking, whereupon the speaker utters, *Boy is he cute!* The hearer easily locates the antecedent for *he* from the contextual setting. This is referred to as pragmatic anaphora (or "deep" anaphora) by some authors (e.g. Hankamer & Sag 1976). Rochester et al. (1977, p. 105) have noted that schizophrenics demonstrate perfect command of this pronominalization process. Buckingham (1979, p. 279) has described the same ability in Wernicke's aphasics and in anomics. Providing pragmatic anaphors does not seem to depend on intact lexical access for content words.

The maxim of Quantity may also be broken by schizophrenics. The tendency for "overinclusion" that Schwartz writes of could easily lead to the inclusion of excess items from the same conceptual category. This would result in an overload of detail not required for the specific purpose of the conversation. In addition, Hoffman et al.'s (1982, p. 217) typology of disordered discourse (what they refer to as "non-strong hierarchical bases") includes the general rule that there is a nontransitive dependency among chains of statements. For instance, there could be a chain of statements that meteorologically explains the current situation that "it is presently raining." This utterance could then give rise to another chain of statements that would deal with social engagements that had to be canceled because of the inclement weather. However, taken as a complete discourse, the text would appear aberrant, not because the meteorological statements are irrelevant to the cancellation of the plans for the day (i.e. not a failure of the maxim of Relation), but rather because the meteorological information is more than the situation calls for. The statement "It is presently raining" is all that is required for explaining the cancellations. This type of break in presuppositional transitivity is witnessed in schizophrenia, as Hoffman et al. (1982) point out. It leads to a great deal of incoherence and, although this is not mentioned by Hoffman et al., shows quite clearly how the schizophrenic could fail Grice's maxim of Quantity.

We may now ask the following questions: How are the schizophrenics failing to fulfill the conversational maxims, and why are they failing them?

It would appear that schizophrenics are by and large flouting, but in some exacerbated sense such that hearers quite often cannot draw implicatures. In the strict sense, of course, the schizophrenics are not flouting for the simple reason that their hearers are not bridging to the implicatures. However, they certainly do not appear to be violating (misleading or lying), opting out, or clashing. This, in turn, implies that they are still abiding by the principle of cooperation when they are speaking. I believe it would be wrong to claim that schizophrenics are willfully misleading listeners or volitionally lying to them. Nor do I believe that there is necessarily any desire to be vague or ambiguous. Grice's claim is that normal speakers flout maxims with regularity, but they flout them in such a way that their

listeners can normally make the "bridges" or "link," and thereby draw the inferences with ease. The extreme flouting by schizophrenics, however, quite often leaves too many bridges for hearers to span. The patients fail to take the view of the listener into account, but the failure does not appear to be purposeful, and so they cannot rightfully be labeled as uncooperative. Listeners, nevertheless, are forced to operate under a computational overload when decoding schizophrenic discourse.

Why, then, are schizophrenics flouting in the extreme? Most researchers, including Schwartz, have ruled out thought disorders, language problems, aberrant word associations, and lower intellectual functioning. I would also suggest we rule out word-finding deficits, at least in the normal definition of the term.

An inability to sustain attention could be at the heart of much of the incoherence, as Schwartz suggests at one point. It could lead to disruptions of the nontransitivity constraint and thus to a failure of the maxim of Quantity. Attention to the first chain of statements could be more easily diverted to the second chain by the intermediate utterance (e.g. "It is presently raining" in our example). A reduced attention span may make it more difficult for the schizophrenic to hold on to the manner in which some antecedent was provided – or to whether it was provided at all. In this case the maxim of Manner would fail to be fulfilled. For example, if antecedent information is provided in an anaphoric island (i.e. semantically, not syntactically), the speaker would have to attend to this fact so as to produce the given information later as an item preceded by the definite article and not as a pronoun. Hoffman et al. (1982, p. 228) suggest that schizophrenics probably begin speaking with a coordinated topic in mind, but that in the course of the text part or all of the contextual frame is lost. Later utterances may only hold together in immediate discourse sections, while losing their links to earlier statements.

I would point out, however, that attentional difficulties need not imply, in general, that the problem rests with short-term memory. Hoffman et al. (1982, p. 230) have evidence that a patient's attention to a topic was derailed by some "intrusive" thought, but that after several utterances concerning that intrusion the patient returned to the original context and continued. Intrusive thoughts or ideas are usually inhibited or edited out by normal speakers, and so what we have is perhaps a breakdown in discourse editing caused by a reduced ability to maintain moment to moment focus on what is being said.

To the extent that we can ultimately discover a clear-cut cognitive explanation for the conversational aberrance of schizophrenics, we will be able to show unambiguously that when speaking they are operating in a cooperative manner and that the problems their hearers have are not the product of volition or a willful desire to confuse or mislead. Since the whole issue is ultimately social in nature, it makes sense to approach the language of schizophrenics from the standpoint of the sociology of conversation and the logic that it entails. For this reason, I suggest that we use Grice's conversational maxims as an avenue of research into the discourse of this patient population. In so doing, we stand to learn a great deal concerning normal comprehension strategies as well.

Accounting for linguistic data in schizophrenia research

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Language is a multilayered system of communication whereby meaningless elements form by rule into meaningful messages. In this sense, schizophrenics do not have a language. Rather, that subset of patients who evince odd speech can be said to manifest deviation from a language. Many researchers, rightly or wrongly, have still referred to schizophrenic language, apparently because of the recognized syndrome of linguistic deviation that can occur in schizophrenics. If these deviations are caused by a lapse in linguistic competence, albeit usually temporary or intermittent, then we can speak of the disruption in the language of schizophrenics, which is evidenced in disordered speech. If, however, we do not admit that such a lapse represents disruption in language, then the conclusion must be that schizophrenics who talk in odd ways do so when they have complete command of their language. That is, they deliberately utter glossomanic chains, inappropriate rhymes and alliterative strings, perseverative phrases, word salads, even total gibberish. Since the only population I know of that does all of these things as part of their illness is the subset of schizophrenics who exhibit speech disorder, perhaps, schizophrenics do indeed have a language of their own.

The first problem in research is to ensure that one is comparing like populations. Schwartz does not consider repeated diagnoses of schizophrenia by psychiatrists an adequate assurance of this criterion. Unfortunately, few studies have elucidated the actual criteria of diagnosis of patients. Some content themselves with reporting only discharge diagnoses, without telling how those were arrived at. If we were to take Schwartz seriously, we would have to scrap a large portion of the existing studies. Fortunately, as Schwartz himself notes, there is very good interjudge reliability in determinations of the schizophrenias, so this is hardly necessary, and studies like Chaika (1974), which rely heavily on comparative data, may still have validity.

A far greater failing in reported studies arises from the sporadic nature of speech disruption. Some diagnosed schizophrenics never exhibit structurally deviant speech, others do so occasionally, with only a very few, those who used to be called "process" schizophrenics, doing so virtually all the time. If we are to understand the nature of deviation, then, we must be sure that we are testing only those patients who are or have been speech disordered at some time(s) in their illness. Too often, this elementary precaution seems not to have been taken. Researchers, especially those doing formal experimental protocols, do not even mention the degree of deviation, if any, in their subjects. Perhaps this is why so many researchers have come up with conflicting results. Chaika (1974), in an effort to define the problem accurately, compared the speech of one chronic schizophrenic to several samples from others long reported in the literature as typically schizophrenic. Contrary to what Fromkin (1975) and the target article assert, that paper did consider speech data from more than one source.

Not only is it necessary to include only those patients who show pathological structural deviation, it is necessary to account for all reported deviations in that population. Again, researchers have typically tried to explain some, but not all of the syndrome. For instance, it is common to say that schizophrenics rarely show agrammatism (e.g. B. D. Cohen 1978, p. 1). However, word salads have long been recognized as symptomatic of schizophrenia, and examples of both agrammatism and outright gibberish are not impossible to find, either in patients or in the literature [sic] (e.g. Chaika, 1974; 1982c; Herbert & Waltensperger 1981). Any explanation for schizophrenic speech that refuses to account for all of the data is suspect. Furthermore, any explanation for pathological speech should also account for the reasons some schizophrenics rarely if ever evince it, or at least be consistent with that fact. Other facets of schizophrenia must also be accounted for in any explanation. For instance, Chafe (1980:13–16) shows the parallels between normal eye movements and normal discourse. Dysfunctions in schizophrenic eye movements have been well documented (Holzman 1978). The connection between these and all of the reported speech dysfunctions must also be considered. Other facets of schizophrenia, such as hallucinations and effective medications, also cannot be ignored (Chaika 1982b).

The final challenge in linguistic investigation is to ensure that one's procedure actually tests for abilities and processes used in normal speech production (Chaika 1982b). The real problem with word association testing is that it does not mirror actual strategies of production. Normal speech is subordinated to a topic. If a person is reminded of something outside of the topic, there are regular strategies to announce a topic change. If normal individuals do change a topic, they flit to another topic, not to a series of random associations like "Looks like clay/sounds like gray/take you for a roll in the hay/hay day/May day/help" (B. D. Cohen 1978, p. 29). Subordination of utterance to topic is not just pragmatics. We know today that syntax operates not on the level of sentence, but on the level of the discourse as a whole (see, e.g., Labov & Fanshel 1977; Van Dijk 1980). Sentential grammar is usually determined by requirements of discourse, such as the signaling of new and old information. In fact, so important is topic to comprehension that even if speakers do not overtly signal the connections between sentences, hearers can usually fill in their relationship simply by relating them to the topic at hand (e.g. Slobin 1979, p. 52). This is why so many actual conversations may seem on the surface to be disjointed when, in fact, they are perfectly lucid (Chaika 1981). Salzinger's findings of poor predictability in schizophrenic speech (Salzinger, Portnoy & Feldman 1978) arise from the failure to adhere to topic. Normal speakers can predict so well that frequently they can even fill in a word for a speaker (Schegloff, Jefferson & Sacks 1977). Failure to adhere to discourse rules, then, is a serious disruption in speech. Similarly, eye contact and kinesics are integral parts of linguistic communication. Failures in this sphere are, accordingly, serious (Chaika 1982a).

The relevance of studies of pigeonholing to normal speech production is doubtful. Synonyms often cannot be used in the same environments. That is why translation is so difficult. Hence, it is not clear how a deficit in putting words in semantically related categories explains, for instance, glossomanic chains which, as it happens, often take the form of uttering semantically related words. In the same vein, the idea that schizophrenics have a semantic deficit is not borne out by the evidence. Quite the opposite frequently seems to be true: semantic overloading, thinking of too many meanings of a word at once (Chaika 1974; 1982c; Vonnegut 1976).

Finally, tests of memory do not test for the intactness of abilities needed for linguistic production. Knight and Sims-Knight's (1979) interesting protocol does not demonstrate that schizophrenics have no filtering problems, as Schwartz suggests, or that they do have a pigeonholing problem. It has long been known that hearers extract the semantic meaning of utterances and then forget the actual syntax that was used in encoding (e.g. Slobin 1979, p. 42). It is expected that normal speakers would misjudge paraphrases as old sentences, as they are judging on the basis of meaning. It is entirely possible that schizophrenics who judge paraphrases as "new" have simply forgotten the meanings of the previous sentences.

How should schizophrenic thought and language be studied?

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We disagree with several of Schwartz's conclusions about the evidence on schizophrenic thought and language. Our disagreements reflect a basic difference concerning the principles of useful evaluation of research. We believe that Schwartz overstates the importance of negative findings. He rejects other writers' formulations unless they are so robust that supportive data are found regardless of the kinds of schizophrenics studied (acute or chronic, severely disturbed or slightly disturbed), the conditions of testing (on drugs or off drugs), or the methods of measurement (reliable or unreliable measures, tasks matched or unmatched on psychometric characteristics in measuring differential deficit). Also, although he acknowledges that schizophrenia is heterogeneous, he implicitly assumes, in his evaluation of evidence for specific theories or hypotheses, that a single defect should be found in all patients. Differences between subjects who do and do not show a defect may indicate meaningful subgroups within schizophrenia. Differences between tasks or conditions that yield differing results may clarify the nature of the defect.

To review the evidence concerning each disputed conclusion would require a discussion much longer than is possible in the allotted space. We shall, therefore, limit our remarks to two of Schwartz's conclusions that illustrate our different view of research evaluation.

Schwartz argues that further work on word associations is not likely to lead to greater understanding of schizophrenia because schizophrenics' associates are not less common or more deviant than those of nonschizophrenics. Several recent studies compared conventional word-association task performance of schizophrenic and control groups matched by age, education, and, frequently, an intellectual measure, such as vocabulary; they have found that schizophrenics, or at least some specified set of schizophrenics, give less common word associations than control subjects (Lisman & Cohen 1972; Magaro, Abrams & Cantrell 1981; Moran, Mefferd & Kimble 1964; Penk 1978; and Penk & Kidd 1977). Yet Fuller and Kates (1969) did not find less common associates in schizophrenia, and even those investigators who did, did not find them in all their schizophrenics.

Several investigators have made progress in resolving this apparent contradiction by studying the kinds of stimulus words to which schizophrenics make deviant responses and the kinds of schizophrenics who make them. Schizophrenics are found to show a clearer deviancy of commonality on stimulus words that have been described as "high interference," "flat slope," "ambiguous," "low commonality," or "weak." All of these terms designate stimulus words that elicit two or more response words nearly equal in frequency rather than eliciting a single dominant response that is much more frequent than other responses. Less common responses to flat-slope words were reported by Lisman and Cohen (1972) and was reconfirmed by Magaro et al. (1981), Penk (1978), and Penk and Kidd (1977). The findings appear to indicate that competition between potential responses is a source of schizophrenics' deviant commonality scores.

Other studies have given evidence on the kinds of schizophrenics who give low commonality responses. Dewolfe and Fedirka (1978) found that reactive schizophrenics showed a greater increase in disturbances in a high-interference condition than did process schizophrenics. Magaro et al. (1981) found that nonparanoid schizophrenics are deficient in popular word associations to low-interference stimulus words but paranoid schizophrenics are not. Such findings may make it possible to identify meaningful subgroups within schizophrenia that differ in these congitive symptoms.

Although several of the above investigators matched groups on age, education, intelligence, and sex, none reported social class. Schwartz renders a service by reminding investigators of the relevance of social class to measures of cognition, but he renders a disservice by concluding, in the absence of appropriate data, that social class accounts for the differences that have been found. Also, the finding that schizophrenics give uncommon responses to high-interference stimulus words seems more consistent with what is known about schizophrenia than with what is known about social class.

Several of Schwartz's arguments that schizophrenic word associations are nondeviant were based on tangential, almost irrelevant, theory or evidence. Lisman and Cohen's (1972)

contention that schizophrenics have a normal associative repertoire from which to sample does not contradict the empirical phenomenon of schizophrenics' associative deviancy. Lisman and Cohen were merely offering an alternative interpretation of the observed deviancy; specifically, they suggested that schizophrenics are unable to edit out inappropriate responses from their nondeviant repertoires. Similarly, Schwartz errs in pointing to our own work (Chapman & Chapman 1973) as relevant to the issue of schizophrenic deviancy in associative responses. We found that when schizophrenics interpret the meaning of a word presented in the context of a sentence, they often rely on the strongest aspect of meaning regardless of whether that meaning is appropriate to the context at hand. Schwartz points to this principle as "just the opposite of the pattern expected if schizophrenics give rare associations." We disagree. We never suggested that schizophrenics, when presented with words out of context, interpret them in accordance with more common meanings than do control subjects; in addition, interpretation of words is not a free-associative response.

We also disagree with Schwartz's reiteration of Hemsley's (1975) and Hemsley and Richardson's (1980) conclusion that the evidence is weak for a schizophrenic defect in Broadbent's (1973) filtering, that is, in the selection of stimulus input on the basis of its physical characteristics. Dozens of studies have reported a schizophrenic deficit on tasks that require the subject to ignore one of two voices, or noise, or a message presented to one of the ears, or some other distracting stimulus. The studies of Oltmanns and Neale (1975) and Oltmanns (1978) are especially convincing. By using tasks matched on reliability and difficulty for normal subjects, these investigators ruled out generalized performance deficit as a source of the schizophrenics' lower accuracy on the distraction task than on the control task. Schwartz's rejection of a filtering defect in schizophrenia on the basis of a single negative study by Pogue-Geile and Oltmanns (1980) is inappropriate.

A useful evaluation of a field of research must be based on all the major studies on the topic. The evaluation should consist of a fine-grained analysis of designs, measures, and kinds of subjects, and the relation of each to the findings. When faced with conflicting evidence, the reviewer's proper task is to study the variables that distinguish studies with differing outcomes. The study on conflicting findings can often increase understanding of the phenomena under investigation.

Schizophrenic speech as cognitive stuttering

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Schwartz's title asks the question, Is there a schizophrenic language? On the basis of available evidence, the answer to this question is, no, there isn't. Other things being equal, schizophrenic persons appear to be no better able to understand one another's communications than are other listeners (Cohen & Camhi 1967). Nor does the evidence support the more plausible notion that there are idiosyncratic schizophrenic languages (Cohen, Nachmani & Rosenberg 1974). As Schwartz concludes, schizophrenic speech peculiarities do not imply a *language* deficit, as such. They represent deficiencies in linguistic *performance* rather than *competence*. Bleuler (1950) considered the speech symptoms to be "secondary symptoms," secondary to a primary cognitive deficit which, for him, involved a disturbance of "association."

Schwartz brings Bleuler's approach up to date in his delineation of several "information processing" variables by means of which he hopes to specify the nature of the primary cognitive deficit(s) underlying the more superficial and variable secondary symptoms.

There is, I believe, an implicit assumption shared by many investigators in this field to the effect that the "deeper" or more "central" the cognitive processes one implicates in the primary deficit, the closer one gets to the discovery of links between the phenomena of schizophrenia and something pathological in the brain. This is consistent with an older tradition in which schizophrenic speech has been compared to aphasia (see Woods 1938). However, it may be worth emphasizing here that such centrally conceived variables as "filtering" or "pigeonholing" – to name two discussed by Schwartz – are susceptible of radical alteration by social and psychodynamic processes which can affect human information processing even in the absence of nervous system pathology.

While no one doubts that aphasia is based on specific brain lesions, there is considerable doubt that stuttering, another speech disorder, is. Most treatments of stuttering imply that its acquisition and evocation are primarily in response to psychosocial determinants – although, to be sure, there are hypotheses, and some data, that implicate disturbances in stutterers' brain function (Eisenson 1958; West 1958). Be that as it may, I consider stuttering to be a psychosocial disorder and have found it useful in teaching and clinical practice to consider schizophrenic communication disturbances as forms of "cognitive stuttering." This analogy has some support when one recognizes that both sets of phenomena involve serious nonfluencies, for example, blocking and perseveration. It is true, of course, that schizophrenic nonfluency is ideational, involving the semantic and pragmatic aspects of language function, while stuttering is exclusively phonological: The communicability of stutterers' utterances, once uttered, remains normal. Nevertheless, the similarities are intriguing. To name a few more: Both phenomena are likely to increase at points of high uncertainty in verbal discourse (Goldman-Eisler 1958; Maher 1972; Schlesinger, Forte, Fried & Melkman 1965); both increase when the speaker is under heightened stress or anxiety or when the speaker anticipates listener antipathy; and both are, in fact, aversive to listeners.

Flimsy as the analogy of stuttering may be, and acknowledging that the overlap noted may not altogether exclude aphasia, I believe that stuttering is a more constructive analogy to schizophrenia than aphasia, if for no other reason than that it is somewhat less likely to seduce researchers and clinicians into pigeonholing schizophrenic communication phenomena as symptoms of a brain disease and thus possibly filtering out prematurely very different approaches to their understanding and treatment.

Psychiatric diagnosis: A double taxonomic swamp

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Before a category or natural kind can be related to another, there must be some acceptable agreement as to what properties characterize the kinds. Physics and chemistry got off the ground with a workable preliminary classification of natural kinds such as "water," "mineral" and "glass," whose defining cluster of properties are taken as fixed for the time being. What the Schwartz article forcefully indicates is that we are getting nowhere slowly because neither the kind "schizophrenia" nor the kind "language deviance" can be reliably specified. To be mired in one category swamp is plenty, but when faced with two, the conceptual and empirical questions become irremediable, at least under existing taxonomic formulations.

Behavioral and biological scientists tend to be trustingly naive when they enter the domain of clinical psychiatry. The oft-run scenario plays something like this. "We have a new test for measuring X. Let's try it on schizophrenics to see if they score differently from normal subjects or other patients." Psychiatrists obligingly provide a group of schizophrenics and the test is tried out. The resultant inconclusive mess stems from the simple fact that since the construct "schizophrenia" lacks both definition and criteria, the conglomeration of "schizophrenics," provided in good faith by the psychiatrists, possess such a wildly disjunctive set of properties that nothing useful comes of the study, except perhaps the suggestion that this is not the way to go.

Schwartz refers to DSM-III studies in which the kappa for interrater reliability of a diagnosis of schizophrenia reached .81 (Spitzer, Forman & Nee 1979). Kappa is a statistic that applies to the agreements of only *two* judges. In the field trials of DSM-III, in one-third of the cases, the diagnostic assignments of two clinicians were made after a simultaneous interview with the patient during which the clinicians may well have exchanged a considerable amount of information by means of the way in which questions were asked and emphasis placed, and by other sorts of indirect shared code-signals. In the other two-thirds of the cases, clinicians were encouraged to exchange "relevant data." If one clinician tells another that "the patient reported an auditory hallucination in which a voice keeps up a running commentary on his thoughts and he said he's never told anyone about it before," the information is a giveaway as to what diagnosis the reporting clinician is thinking about, since the category "schizophrenic disorder" is the only one in which that particular symptom is described. It is not just interjudge agreement that is important but *how the agreements are arrived at*.

Although astutely critical of the research in this area, Schwartz rolls right along throughout his article discussing schizophrenics doing this and schizophrenics doing that under the assumption that we all know what he is talking about when he refers to "schizophrenics."

When it comes to the property set characterizing language deviance, we sink into another swamp. If patients are diagnosed by psychiatrists as "schizophrenic," in part because they talk or write oddly, then it should be no surprise when linguistic studies find these patients show language deviance. A functional class X is one whose members produce actions or objects of class Y. Members of a functional kind (e.g. "schizophrenia") can be hypothesized to produce actions or objects that are members of another functional kind (e.g. "language deviance"). To establish a dyadic lawfulness, or at least correlation, between two functional kinds, the properties of each kind must be delineated *independently*. Why this tautologous mistake, generously supported by federal grants, has been made so repeatedly remains a mystery for all to ponder. Schwartz drives this circularity point home, and I hope his article will help the error become obsolete.

When a psychiatrist says a patient shows "loose associations" or "thought disorder," he usually means he finds it difficult to follow and understand what the patient is saying. The patient seems to jump around so much in his speech that his flow of communication lacks referential continuity, at least to the psychiatrist. From an information-theoretic point of view, "being difficult to follow" is as much a functional property of the receiver as of the speaker. Messages have both semantic and pragmatic meaning, signification and significance. As sign complexes, they signify webs of concepts and they are used by purposeful message-sending agents to produce intended responses in recipients. From a sender's messages, a recipient selects those features that are functionally important or salient to him. The selections may or may not correspond to the signification and significance of the messages intended by the sender. The semantic and pragmatic meanings of a received message are relative to the recipient's ensemble of alternative possibilities whose ordering has been determined by the recipient. That meanings of messages are relativized to the reference frame of recipients is hardly a new idea.

A beginning psychiatrist may have great difficulty in understanding some of his patients. Experienced psychiatrists may have much less difficulty with the same patients. Even the beginner will learn that the longer he talks with his patient, the more background information he obtains about the patient's history and present situation; and the more he knows about his beliefs, desires, and values the easier it becomes to "follow" him. With each gain of information, it becomes less obscure what the patient is referring to and what semantic and pragmatic meanings are being carried by his idiosyncratic expressions, which on a first hearing appear bewildering. This suggests that in choosing his messages the patient attributes too much initial information to his listeners or an obfuscating strategy is being called up to protect himself in an unfamiliar, difficult, and distressing situation which can harm as well as benefit him. It is not just language that is involved in clinical discourse but *communication* in which the sender's beliefs and attitudes about himself, about the recipient, and about the subject matter of the message must be taken into consideration. All this is such elementary communication theory that perhaps it should not be brought up in a journal of this sophistication. As Gide remarked, however, one must say the same things over and over because nobody listens.

It is easy enough to criticize the obvious. What is to be done? The problem is taxonomic. My feeling is that we have gone as far as we can with the few signs and symptoms currently available. No amount of statistical juggling or computer programming is going to yield new clusters of clinical usefulness. We need new properties. Also, it seems to me that clinical classifications require a new approach in which individuals, rather than disorders, are grouped into functional similarity classes. Rather than trying to fit individuals into kinds based on clinically intuited property sets, we need new class-defining properties based on systematic empirical inquiry, including responses to management decisions that feed back into the initial groupings to stabilize or revise the taxonomic structure (Colby & McGuire 1981; Colby & Spar, in press).

Schizophrenia: First you see it; then you don't

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Schwartz's target article presents some useful critical analyses of the question, What is all this about schizophrenic language? Perhaps of greatest impact on current thinking is his challenge as to whether thought disorder as most people think of it today exists. This cardinal feature, which interview-dependent clinicians have used for diagnosis of schizophrenia, has implied a breakdown in conceptual structure, that is, a "marked loosening of associations" (American Psychiatric Association 1980). From Kelly (1955) we have operations to measure conceptual structure that are far better than Jung's word association technique. For example, in our culture people typically have an association between "honest-dishonest" and "sincere-insincere," but this association differs reliably from one person to another. For one person, the correlation coefficient may be 0.9, for another, 0.4. Seldom would it be 1.0 (as for synonyms) or 0.0 (no association at all). The notion held for decades (see Bannister 1962; 1963) is that schizophrenia loosens these ties of association and clustering. Essentially, Schwartz is challenging this. So have we.

We (Dingemans, Space & Cromwell 1982) have gone about making the challenge in a different way. We gave "repertory

grids" to schizophrenics, depressives, and normal control subjects and then had the grid ratings repeated within a week. (A repertory grid is a matrix of subject-nominated people, each rated on each of a number of subject-elicited construct dimensions – see Kelly 1955.) We know (e.g. Bannister 1962; 1963) that schizophrenics have lower correlations (both positive and negative) among the various pairs of elicited constructs, which suggests that their associational bonds (conceptual structures) are looser. We also know that there is no remarkable change in associative strength if the ratings are repeated. Suppose, however, we assume that these lowered correlations do not result from loosened conceptual structure (in long-term memory) but instead from temporary attentional disruptions. If so, then we should find the following sequence of consecutive ratings: quite reliable test-retest stability, then (once an attentional disruption occurred) a string of consecutive inconsistencies (test-retest discrepancies) regardless of constructs and persons being rated, and then a recovery of consecutive test-retest agreement This is what we found and demonstrated statistically.

Since a momentary deficit followed by complete recovery is more probably an attentional rather than a long-term memory problem, and since we could demonstrate no persistent impairment in the use of specific constructs or in the ratings of specific persons, the conventional notion of thought disorder is placed in doubt.

The alternative attentional deficit interpretation which we offer is not one of a permanent or persisting specific deficit in the sequence of information processing, nor is it a processing-capacity deficit. Instead, the deficit comes and goes. And, indeed, Schwartz describes the same thing for schizophrenic language.

The phasic nature of schizophrenic deficit can also be described with choice reaction time (Space, Nideffer, Cromwell & Dwyer 1982). A person looks at a pair of lights and lifts his right finger off a key if the right light goes off, his left finger if the left light goes off. Among normal subjects an impressive straight line function of speed-accuracy trade-off can be plotted. With more speed, there is less accuracy in lifting the correct key; with less speed, more accuracy. The steepness of this straight line slope can be related to sensitivity in signal detection analysis. Do schizophrenics operate in this straightforward fashion? No. The faster trials of the schizophrenics are indeed like the faster trials of the normal subjects: a straight line slope. With slower trials the slope shifts. There is less purchase of increased accuracy with the decreased speed, that is, less sensitivity than the same schizophrenic subjects demonstrated in their fast trials. A trial-by-trial interpretation makes the shifting slope simple to understand. Once in a while the schizophrenics have trials that are both slow and inaccurate: a phasic attentional deficit. On other trials they show the same speed-accuracy trade-off as normal subjects. First it is there. Then it isn't.

Schwartz argues effectively for a pigeonholing deficit in schizophrenia. So do we. In fact, in the repertory grid study cited above, schizophrenics and depressives were equally deficient with respect to test-retest changes in ratings, but the schizophrenics made significantly more slot movements (changes in ratings that crossed the midpoint from one side of a 6-point scale to the other). This slot movement (also called polarity change) is a clear illustration of pigeonholing difficulty. On the other hand, the evidence for pigeonholing does not rule out the possibility of filtering and sensitivity deficit. The interpretation of our choice reaction time study in terms of sensitivity fluctuation is an illustration of this.

Another aspect of the problem is definitional. After we leave the operations of the earliest stage of information processing (iconic registration and decay) the operations for filtering, short-term memory, and response selection do not seem clearly separated. Thus, an interpretation of pigeonholing to the exclusion of filtering or sensitivity would seem hazardous.

In conclusion, we would argue that we will not understand schizophrenia unless we take into account the phasic aspects of the deficit. Time segments frequently occur where a previously identified deficit cannot be found. We would also argue that the problem of schizophrenia will not be solved as long as we restrict ourselves to primitive interview techniques to identify global clinical symptoms. Only with more precise measures of deficit can causal pathways be traced in order to interrelate etiology, current impairment, effective intervention or prevention, and favorable prognosis.

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Advances in schizophrenia research: Neuropathologic findings

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Schizophrenia is a diagnostic term which describes an association of characteristic disturbances found in a group of disorders of differing etiologies. A chronic subgroup, marked by deterioration of the course of the illness and negative, anhedonic symptoms, is highly suspect for having a neurobiologic disturbance. On the other hand, acute and remitting disorders are not necessarily associated with either a biologic disorder or a poor prognosis. Therefore, generalized conclusions about "schizophrenia" are fraught with hazard.

Schwartz's review on schizophrenic language and cognition oversimplifies comprehensive discussions of the material presented in *Language and Cognition in Schizophrenia*, edited by Schwartz (1978b). In that volume the contributors discussed critical variables such as heterogeneity of the syndrome, medication effects, genetic predisposition, time course and chronicity, and the degree of psychotic decompensation, thus pointing to the provisional nature of conclusions from their research.

For example, Koh's chapter (1978) draws only interim conclusions about memory function in schizophrenia and cautions that research findings were derived from a population that was not acutely psychotic but in various phases of recuperation and on a variety of medications. Schwartz (1978c) reviewed a study by Dokecki, Polidoro, and Cromwell (1965) of rare word associations which is of interest with respect to the acute–chronic dichotomy. In this report the poor premorbid schizophrenic subgroup gave rare associations whereas normal individuals and good premorbid schizophrenics gave common responses.

Most of the language and cognition research has been conducted under the assumption that structural or neurologic defects were not present in either childhood or adult schizophrenia. Recent research, however, may provide a neurobiological framework for understanding schizophrenia that is relevant to language and cognition studies. A brief review of research on neuropathology will summarize trends.

Darby (1976) reviewed 33 cases of childhood psychosis who had postmortem exams. He summarized a variety of neuropathologies found in 27 cases. Campbell, Rosenbloom, Perry, George, Kricheff, Andersen, Small, and Jennings (1982) found ventricular enlargement by computerized tomography (CT) scans in a subgroup of diagnostically homogeneous autistic children. Andreasen, Olsen, Dennert, and Smith (1982) identified a subgroup of chronic schizophrenic patients with ventricular enlargement (by CT scan) who showed impairment in sensorium and symptoms of alogia, affective flattening, avolition, and anhedonia. Golden, Graber, Coffman, Berg, Newlin, and Bloch (1981), using CT scan density measurements, proposed

that a subgroup of schizophrenic patients who are generally labeled as process schizophrenics have structural deficits, particularly in the left frontal areas of the brain. Luchins, Morihisa, Weinberger, and Wyatt (1981) reported an inverse relationship between abnormal occipital asymmetry and vermian atrophy in postmortem brains and hypothesized that brain atrophy and abnormal cerebral asymmetry represent two distinct etiological factors in schizophrenia. Abrams, Redfield, and Taylor (1981) found lower verbal, performance, and full scale IQs in rigorously diagnosed schizophrenic patients with relatively poorer performance on language tests when compared to patients with affective disorders. Gattaz, Beckmann, and Mendlewicz (1981) suggest that human leucocyte antigens (HLA-B27) may provide a genetic marker for vulnerability for a subgroup of schizophrenics and offer the potential to differentiate certain subtypes.

These and subsequent studies are likely to bring further refinements to our diagnostic classifications and improve our understanding of the etiology of these disorders.

Failure to establish appropriate response sets: An explanation for a range of schizophrenic phenomena?

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I should first like to make a few specific points concerning this target article, addressing in particular the issue of whether a greater concern with certain subgroupings of schizophrenia may clarify the nature of their cognitive functioning. This will be followed by an attempt to indicate the ways in which defective pigeonholing may relate to the more general abnormalities shown by schizophrenic patients, in particular its possible role in the mechanisms underlying hallucinatory experiences.

Schwartz's discussion of schizophrenic response biases fails to mention research by Williams, Hemsley, and Denning-Duke (1976) which suggested that it is only chronic schizophrenics who show the strong meaning response bias. These authors indicate that their findings are consistent with Broen's (1968) hypothesis that reduced consideration of alternative meanings "may be learnt over time in an attempt to cope with response disorganization" (p. 146). In this connection it is also worth clarifying the results of the study by de Silva and Hemsley (1977). Schwartz reports this as indicating deteriorating performance by schizophrenics, on a task requiring the guessing of missing words, with increasing context. It should be noted that this was a feature only of the acute schizophrenic subgroup, the chronic schizophrenics' performance remaining stable across context conditions. Again, an interpretation of the data in terms of a learned narrowing of attention in chronic patients appears possible. Evidence for reduced cue use by chronic schizophrenics on perceptual tasks has been presented by Cegalis and Tegtmeyer (1980). Hence, although the interpretation of acute-chronic differences in terms of intraindividual change rather than sampling biases remains hazardous, it would appear worthwhile to consider this dimension in the assessment of cognitive abnormalities. There is also evidence that subgroupings of schizophrenia derived from psychophysiological assessment may be relevant to performance on the kind of tasks reviewed by Schwartz. Gruzelier and his colleagues (e.g. Gruzelier & Venables 1975) distinguish two patterns of skin-conductance responding in schizophrenia, an absence of skin-conductance orienting responses to auditory stimuli (nonresponders) or a failure to habituate (responders). Straube (1979) compared schizophrenic responders and nonresponders on a dichotic listening task, subjects being required to shadow material coming from one earphone. The nonresponder group made significantly more errors of omission than the responders and also showed a symptom pattern of low spontaneous activity and withdrawal. Straube suggests that the increased omission errors should be interpreted in terms of reduced stimulus intake and that both withdrawal and hyporesponding should be regarded as protective mechanisms.

Research into cognitive impairment in schizophrenia has sought to specify the structural limitations and capacity restrictions of particular stages of processing. However, cognitive psychologists are increasingly interested in the factors affecting the use of these structures to achieve particular goals. Underwood (1978) has argued that the strategies we can isolate will be defined in terms of the information used by the subject, the stages of processing applied, and the effects of a given strategy upon behavior. The acute-chronic differences discussed above may reflect the operation of one such strategy.

In part, optimal strategies are dependent on expectancies, built up on the basis of the redundancy and patterning of sensory input, which may be used to overcome the processing limits of the structural features in the system. A failure to establish appropriate response sets, put forward by Schwartz as the central defect in schizophrenia, would indeed be expected to have wide-ranging effects upon behavior. It may even be possible to relate such a disturbance to schizophrenic hallucinations. It has been suggested by Hartmann (1975, p. 73) that "possibly something in the realm of ability to pattern sensory input, or interact with it may be involved in the inhibitory factor" (for hallucinatory experience). As Schwartz points out, schizophrenics may indeed be less able to make use of structure in presented material. It is also clear that the extent of hallucinatory experiences in schizophrenia varies according to the form of the auditory input present (Margo, Hemsley & Slade 1981). These authors demonstrated a negative relationship between both the structure of the material presented and its attention-commanding properties and the extent of reported hallucinations. One might therefore speculate that schizophrenic hallucinations are related to a cognitive abnormality which, even under normal conditions of sensory input, results in ambiguous messages reaching awareness.

An interpretation of abnormalities of schizophrenics' language and cognition in terms of a defect in pigeonholing has one major strength; it may be possible to construct tasks on which schizophrenics would be predicted to perform better than normal subjects. As indicated above, response biases may be viewed as a way of making use of the redundancy and patterning of sensory input to reduce information-processing demands. However, when the actual stimulus presented is unexpected, biases may act to impair performance. Hence, if there is considered to be a general defect in the pigeonholing mechanism in schizophrenia, tasks in which context is misleading for normal subjects may result in schizophrenics' superior performance. Such findings would be less open to alternative explanations than are the many instances of schizophrenics' deficits presented in Schwartz's interesting review.

Verbal encoding and language abnormality in schizophrenia

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Schwartz's proposal that schizophrenics' disorganized language may be explained by thought disorder is compelling but not sufficiently clarified. Although he convincingly disarms the

language deficit hypothesis, his alternative view draws upon purported methodological weaknesses in the literature rather than a broad synthesis. His critical review traces the cognitive dysfunction to defective information processing but does not specify the nature of the abnormality and, therefore, cannot integrate the diversity of research findings or generate predictions. Information processing can be described as involving sequenced phases in which input is detected by the sensory apparatus, registered (coded) for later retrieval, briefly entered into short-term memory, transferred to long-term storage, and possibly responded to (Klatzky 1975). Schwartz's imprecision about the stage at which this process breaks down for schizophrenics leads to several inaccuracies.

First, Schwartz makes little distinction between findings that derive from different stages of information processing (most commonly, response emission and short-term memory in schizophrenics). This confounds the interpretation of outcomes, which are surely a function of the stage inspected. Failure at an earlier level necessarily entails deficit at a later one because of the hierarchical sequence; however, abnormalities in overt responding to stimuli tell nothing about the initial processing. Second, Schwartz suggests that the schizophrenic disorder may be one of pigeonholing, which he defines as "adopting a response set" and possibly "responsible for schizophrenics' tendency to rely on shallow levels of encoding." This is a reversal of the actual information-processing chain, in which defective encoding precedes and could account for pathological response selection.

In contrast to Schwartz's conclusion, a broader and more parsimonious theory implicates problems in schizophrenics' encoding, the first stage of information processing after a stimulus impinges on the sensory organ. Whereas research has not delineated specific sensory deficits in schizophrenia (Salzinger 1973), there is mounting evidence to suggest an atypical pattern of registering information. In the normal adult population, stimuli are processed mainly according to their semantic properties rather than physical characteristics or emotional tone. Thus verbal encoding is usually keyed to the meaningful conceptual attributes of words (Wickens 1972). Schizophrenics, however, tend to be lured by the physical and emotional cues embedded in stimuli. The former has been observed in studies of similarity judgment, in which schizophrenics differed from normal individuals in matching pictures based on their color or position instead of their shape or meaning (Kay & Singh 1975; 1979; Kay, Singh & Smith 1975). The latter has been evidenced in the various findings that underlie the affective hypothesis (Buss & Lang 1965), in which schizophrenics showed a subnormal threshold for emotionally loaded words. Failure to use semantic cues has also been demonstrated in verbal memory research, which finds schizophrenics deficient in applying mnemonic strategies dependent on semantic organization (Larsen & Fromholt 1976; Traupmann 1975).

A recent study tested the hypothesis that schizophrenic thought disorder may be traced to abnormal verbal encoding, dominated by salient affective and physical cues (Kay 1982). Schizophrenics and nonschizophrenic psychotics were presented, for short-term recall, a series of word triads related either in concept (taxonomic class), affective quality (good-bad connotation), or physical property (rhyming sound). The fourth triad in each series introduced a shift to words of a different concept, connotation, or sound. The measure of release from proactive interference in recalling the new sets indicated the degree of encoding for each dimension, as per Wickens (1972), while controlling for attentional and other performance deficits (Chapman & Chapman 1978). It was found that schizophrenics, particularly those with thought disorder, relied significantly less on conceptual cues and more on the affective element. This effect was attenuated with more potent concepts, suggesting overall that schizophrenics are oriented to stimulus salience, encoding at a "shallow" level.

The first implication of these data is that the various theories that allude to abnormal schizophrenic responding – for example, "idiodynamic response sets" (Moran, Mefferd & Kimble 1964), "response competition" (Broen & Storms 1966), "associative response intrusion" (Chapman 1958), "response interference" (Lang & Buss 1965) – should perhaps be reconsidered in terms of an earlier stage of information processing. Schwartz's observation of only weak confirmation of these theories may reflect the lack of focus on coding processes.

A second implication is that schizophrenics seem to register whichever input is most intense in a given situation. This "stimulus salience hypothesis" is more robust than Salzinger's (1973) proposal that schizophrenics are attracted to stimuli that are temporally or spatially most immediate. Unlike Salzinger's model, it can accommodate findings that interference in schizophrenics' performance varies with the *nature* of the target stimuli, distractors, and task requirements (e.g. Neale & Cromwell 1972). Moreover, it can encompass the immediacy hypothesis, since salience is usually conferred by prominence in time and space.

The current position also offers a means of disentangling contradictions in the literature cited by Schwartz. One such contrast is the evidence that schizophrenics are highly concrete (Goldstein 1944) but also overinclusive in their conceptual boundaries (Payne 1966). These may both be understood as reflecting failure in encoding conceptually relevant cues. Another seeming paradox is the finding of defective semantic processing of verbal material (Koh & Kayton 1974; Larsen & Fromholt 1976) in the face of Chapman and Chapman's (1973) claim that schizophrenics are biased toward the strong meaning of words. Yet the former data were derived from a free response paradigm, in which nonsemantic alternatives naturally compete with the semantic, while the latter design was limited to a forced choice among semantic alternatives. According to a stimulus salience model, schizophrenics are likely to register the more potent among semantic alternatives (strong meaning) but, when permitted a free range of choice, may overlook the conceptual content of words in favor of the more compelling emotional connotations.

The same principle can explain discrepancies in studies of schizophrenics' word associations (Schwartz 1978a): In forced-choice situations they tend to select more common associates, but they appear "loose" and "idiosyncratic" when responding freely because of competition from the salient affective dimension of words. Likewise schizophrenics' greater difficulty in recall as compared to recognition memory (Nachmani & Cohen 1969) underscores their deficiency in encoding relevant cues, which surfaces mainly where semantic organization is essential. More generally, one may contend that the special disadvantage for schizophrenics posed by situations that are unstructured (Senf, Huston & Cohen 1955), novel (Shakow 1979), or fraught with irrelevant or competing information (Lang & Buss 1965) devolves from inadequate semantic encoding. Thus, their pathology is most striking when the demands for meaningful organization are greatest, that is, when external and preexisting guides (structure and familiarity) are lacking or masked by interfering stimuli. From this perspective, the central problem in schizophrenics' cognitive functioning is not selective attention, as suggested by Schwartz, but rather the effect of ordinary distraction on impaired coding processes.

We therefore concur with Schwartz's general conclusion that schizophrenics' peculiar language reduces to disordered information processing but propose that the abnormality resides at the stage of encoding. Disturbances of attention, memory, and response set as well as other schizophrenic phenomena can be explained in these terms.

Schizophasia is distinct but not aphasic

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Schwartz takes a safe side with the majority opinion in the schizophrenic language issue by stating that the disturbance is not that of language competence but performance. One can hardly argue with this in view of the ample evidence in the literature. As a clinician, I found the statement in the abstract provocative but untrue ("'thought disorder' . . . is usually defined . . . as incoherent speech"). Although thought disorder is often manifested in incoherent speech, nobody denies that one can occur independently from the other. The dichotomous nature of thought and language, however, is enormously complex, as is their interdependence. No matter how much the dichotomy is emphasized, the information processing (or thought) that seems to be disturbed in schizophrenics is also manifested in altered language behaviour. Whether one emphasizes the differences between normal aphasic and schizophrenic speech output (Chaika 1974; Lecours & Vanier-Clément 1976) or the similarities (Fromkin 1975), clinicians agree that schizophrenic language behaviour is identifiable and in many instances clearly deviant from normal and aphasic productions. The similarities to Wernicke's and transcortical sensory aphasia, however, are significant enough that they should have been an important part of the thesis.

Although Schwartz states that his paper is not merely a review, he produces no new data, except to say that word associations by schizophrenics are not different from normal. I am afraid that this does not ring true to clinicians either. The word associations schizophrenics produce may not be rare in word pair paradigms, but they are certainly bizarre in almost all of the examples of discourse in the published literature, or encountered in my practice (see sample below).

The defective information processing that Schwartz considers the essence of schizophrenic communication is an interesting theoretical abstraction supported by some experimental evidence for a central problem of attentional allocation. The emphasis on this, however, fails to answer the basic question, Is there a specific language disturbance in schizophrenia?

A more detailed review of some of the linguistic peculiarities, especially jargon production, morphemic transformation, and the semantic and syntactic errors, would have been more productive. Schwartz, like Fromkin (1975), fails to account for the prominence of jargon in schizophrenia. The distinguishing features of schizophrenic jargon are: (1) intermittency (interspersed with intelligible speech), (2) less structural complexity (Lecours & Vanier-Clément 1976), (3) frequent morphemic derivation, (4) frequent semantic referents and explanations, (5) apparent volitional nature (not always evident), (6) less restriction to replacement of a certain word class (nouns and verbs) than jargon aphasia, (7) high degree of repetitiousness, (8) lack of association with anosognosia (denial of or failure to recognize illness).

Some of the above features may be present in jargon aphasics and some may not be evident in schizophasia, but when a sufficiently large sample of language output is examined, the pattern is distinctive. The occasional patient presents a problem in differential diagnosis, as with the written and oral production of a patient with postencephalitic epilepsy whose irrational behaviour also suggested schizophrenia. The following is a verbatim transcript of his written production:

> Thought for the day – The confrontation with always that of a phase swinging negative which holds purpose to penetrate the resistivity placed by the protective shell surrounding one's being must be experienced prior to one's true ability to radiate a written terminology for means of truely being helpful to another.

This is similar to "semantic jargon" in our terminology (Kertesz 1981) with some important differences. Each word is intelligible, yet often mismatched, such as the verb phrase, "holds purpose", inappropriate, like the noun "resistivity" or "phase swinging negative" (borrowed from his electronic background); or bizarrely complex: "radiate a written terminology." One can get the gist of the idea, which is not the case with transcortical sensory aphasia, where meaning is often completely lost. The impression of impaired syntax is derived mainly from the missing punctuation and clause markers.

There are syntactic anomalies, although a syntactic framework is preserved as a rule in both schizophasia and fluent aphasia. Schizophrenics fail to use some syntactic rules, such as concurrence restrictions or discourse markers like "but," "thus," "then," "however." This, in conjunction with bizarre content, at times produces the impression of impaired syntax. However, this is clearly distinct from the agrammatism of Broca's aphasia or the paragrammatism of Wernicke's aphasia.

The oddity of content, as evidenced from the above sample and loosened associations, are acknowledged by everyone, including Schwartz, to be the central manifestations of schizophrenic language disturbance. He is justified to look at it from the point of view of information processing. However, semantics are an integral part of linguistic considerations, and this aspect deserves more emphasis in the discussion of schizophrenic language.

Evaluating pigeonholing as an explanatory construct for schizophrenics' cognitive deficiencies

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The general conclusion of Schwartz's article, that schizophrenics do not have a language deficit, but rather show some as yet unspecified deficiencies in their information processing, is cogently argued and well supported. That schizophrenics' processing deficit is unlikely ultimately to be explained simply by distractibility or by attentional abnormalities in feature detection at the initial stages of stimulus input (what Schwartz calls a "filtering" deficit) is also consistent with our view. We feel, however, that two major issues in the target article need elaboration, clarification, and development. The first is Schwartz's choice of Broadbent's filtering versus pigeonholing distinction to characterize the differential cognitive deficit in schizophrenics. The second is his avoidance of the important issue of subtype differences in cognitive abilities among schizophrenics. We consider each in turn.

We first outline Schwartz's arguments regarding filtering and pigeonholing, and then summarize our assessment of them. Citing evidence on word association studies and a lexicon structure study (Koh, Kayton & Schwartz 1974), Schwartz argues that schizophrenics' basic categorization with respect to word meanings in general, including hierarchical class-labels as a crucial subset, appears intact. Focusing on selected shadowing and recognition studies, he concludes that schizophrenics' ability to filter stimuli is also adequate. This leaves pigeonholing as a possible basis of the schizophrenic processing deficit. Schwartz cites the results of Hemsley and Richardson (1980) and Koh, Kayton, and Berry (1973) to support his hypothesis of a pigeonholing deficit.

We see strengths and weaknesses in three aspects of Schwartz's argument. First, while we agree with his conclusion

that basic word meanings and their hierarchical relations are intact in schizophrenics, this does not mean that schizophrenics show no deficit in other forms of categorization or organization. Indeed, Schwartz (1978b) himself has made that point. If in some situations schizophrenics organize differently from normal individuals, deficits that appear to be pigeonholing deficits may stem from those organizational differences rather than from differences in pigeonholing. Second, Schwartz does provide some research that suggests that schizophrenics are deficient in pigeonholing and not in filtering. Nevertheless, it is not always easy to determine whether an experimental result is best explained by filtering or pigeonholing. Two examples of this are Schwartz's explanation of the findings of Wishner and Wahl (1974) and of Knight and Sims-Knight (1979). The nature of each type of selective attention has to be specified carefully, particularly when they are generalized beyond Broadbent's formulation. Our third problem derives from the second. Schwartz seems to want to use pigeonholing as a general explanatory construct to account for schizophrenics' cognitive deficiencies. It may be more heuristically useful to keep the notions of filtering and pigeonholing narrow and more precise, and to allow the possibility of other kinds of deficits as well. For example, selective attention occurs only under circumstances of overload of information-processing capacity, and schizophrenics may exhibit deficiencies even when they are not overloaded.

An explanation of our objections requires that we explicate certain of Broadbent's notions. Broadbent originally derived his notions from studies of perceptual attention (1971). Filtering refers to selective attention based on a single feature. Every stimulus that possesses that feature gets attended to and every stimulus that does not possess that feature gets ignored. In one classic filtering situation, subjects were asked to monitor a voice being presented to one ear while ignoring a voice in the other ear (Broadbent 1958). Pigeonholing is also selective attention, but the basis of selection involves multiple features. A common example (Broadbent 1971; 1981) is selection on the basis of categories, for example, a set to respond to names of animals and not to other names. Broadbent (1971) argues that categorization is a separate process, one that occurs automatically as humans process stimuli. This hypothesis leads to one of the important differences between filtering and pigeonholing. Filtering does not require full processing (categorization) of the stimulus, although occasionally such full processing occurs and leads to an intrusion error. Because filtering prevents some stimuli from being fully processed, Broadbent calls it a stimulus set. Pigeonholing requires more initial processing of information. It is thus termed a response set and intrusion errors should not occur.

Although Broadbent's notions of filtering and pigeonholing were developed from experiments in which subjects were instructed to attend to some stimuli and to ignore others during initial perception, Broadbent has applied these notions to other circumstances as well. Selective attention can occur unintentionally, that is, when the subject is not so instructed (e.g. Broadbent 1977). Selectivity can also occur after initial perception. In his 1971 book Broadbent applies filtering and pigeonholing to retrieval selectivity in memory as well. Whether selective attention will occur as a result of filtering or pigeonholing can also depend on the stimulus set. For example, if the letter "R" is to be distinguished from "P" and "B," this is a task in filtering, since the criterion can be presence or absence of a diagonal. If "R" is to be distinguished from "P" and "Q," pigeonholing is required, since this distinction requires multiple features (e.g. Broadbent 1981). Furthermore, whether the selection is based on single or multiple features sometimes depends on the subject, not the stimuli. If a person "treats each stimulus as a kind of bundle of features, with no internal structure, and supposes that the presence or absence of one feature dictates whether the others are to be analyzed" (Broadbent 1977), he will use filtering. If that same bundle is processed as a hierarchically structured set, it can't operate as a filter, but may operate as the basis for pigeonholing.

On the basis of these criteria we have to disagree with Schwartz's classification of the Wishner and Wahl (1974) and the Knight and Sims-Knight (1979) studies. Schwartz classified Wishner and Wahl as a study of pigeonholing, because the subjects remembered both shadowed and nonshadowed words. We would argue that the task measured neither filtering nor pigeonholing because information-processing limits were not surpassed. The lists were only 7 words long, which is well within the processing capacities of normal adults. In addition, the data analyses were based on 8 or 16 word lists, and the same words may have appeared on each of those lists.

The Knight and Sims-Knight study did strain the information-processing capacities of the subjects in one sense, in that the sentences were easily confused and subjects' performance level was low. This is not, of course, the classic Broadbent sense of straining limits, since all sentences were initially perceived correctly. If one assumes that there are no differences in organization between normal individuals and schizophrenics, one can argue that normal subjects attended relatively more to the events the sentences described, while poor premorbid and chronic schizophrenics attended relatively less to the events the sentences described; one can thereby attribute their discrimination to pigeonholing. We cannot agree that the ability to differentiate between sentences that described the central events (which we called Cases) and sentences that described other events involving the same objects (what Schwartz called "irrelevant" sentences and we called Noncases) is filtering. We do not see how such differentiation can be based on a single feature. Both of these discriminations (which Schwartz attributed to pigeonholing and to filtering) required full semantic processing of the initial sentences, and both involve complex distinctions based on multiple features. One could call both pigeonholing, but then one has not explained poor premorbid and chronic schizophrenics' differential performance. Since we see no basis for assuming that the ability to organize disparate stimuli into an integrated schema of an event is intact in schizophrenics just because the meaning of the words in the sentences is intact, we prefer an integration deficit interpretation of this linguistic paradigm. In a second study involving this same paradigm with visual stimuli (Knight & Sims-Knight 1980), schizophrenics' performance equaled that of controls on all dimensions, suggesting that this integration deficit might be limited to linguistic stimuli. Once again, it would be difficult to explain the discrepancy in performance in these two studies in terms of a pigeonholing deficit.

We have focused on determining whether a particular phenomenon found in schizophrenics is a problem of filtering, pigeonholing, categorization, or "none of the above." Most of the research gathered to address this issue was originally designed to test other hypotheses. It must be stressed that ultimately the only way to assess whether the filtering–pigeonholing model can account for such phenomena as response bias, subjective organization, linguistic integration, overinclusion, distractibility, perseveration, shallow versus deep processing, encoding strategies, and the like is first to design clear, empirical studies using Broadbent's paradigms to establish the validity of the model for schizophrenics, and then to design studies that demonstrate that a pigeonholing deficit is the best explanation for these other phenomena.

Schwartz notes some of the problems with the current plethora of diagnostic systems for selecting schizophrenics. He seems, however, to underestimate the seriousness of the problem. It has been shown empirically that different research criteria categorize the same populations in diverse ways (Overall & Hollister 1979) and that each system relies heavily on different subject characteristics in the selection process (Marvinney,

Rosenberg & Knight 1982). We agree strongly with Schwartz's suggestions that researchers should employ objective research diagnostic scales, defend the rationale for their choice of criteria, and provide detailed descriptive data on their subjects. This will allow for some post hoc determination of the comparability of samples when discrepant results arise across studies, but it will only permit weak speculation about which sample difference is crucial. We would suggest, therefore, that investigators systematically measure and analyze various subject characteristics that have been found in other studies of schizophrenics to covary with performance on cognitive tasks, such as premorbidity (Knight, Sherer & Shapiro 1977; Knight & Sims-Knight 1979) and paranoia (Magaro 1981). Also, if specific subject variables have been found important in predicting the course of the disorder (such as, for instance, an affective deficit: Jansson 1968; Knight, Roff, Barrnett & Moss 1979; Strauss & Carpenter 1972), such variables should be assessed to determine whether they play a role in schizophrenics' information-processing capabilities. Only by clear selection criteria and systematic analysis of possible differences within our selected samples will we be able to progress toward the specification of what cognitive process is deficient in what subset of schizophrenics.

Language disorder and hemispheric asymmetries in schizophrenia

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It is difficult to take issue with Schwartz's main conclusion that an information-processing deficit underlies the communication problems of schizophrenics. How specific it is possible to be about the nature of the defective processing mechanism causing the language disorders is a more contentious matter. The search for a fundamental flaw in the schizophrenic cognitive system, a defect that is as specific to that system as thought disorder is seen to be to schizophrenia, has a long and inconclusive history. There has never been any difficulty finding tasks that discriminate between normal individuals and schizophrenics. Evaluating their significance, however, has been more problematic, for two reasons. First, many studies have not included control groups of psychiatric patients to allow it to be determined whether the deficit is specific to schizophrenia or can be observed in other types of patients. Second, task matching has generally been inadequate. As Chapman and Chapman (1973) made clear, if two or more tasks are used with groups of schizophrenics and controls, then demonstrating a schizophrenic deficit specific to one task can only be conclusive where the tasks are matched for difficulty and reliability over a reasonable range of normal performance. If the tasks are not so matched then ceiling or floor effects of varying degrees of subtlety may occur which will reduce the possibility of discriminating between the groups on one or more of the tasks.

The reason for reiterating the second widely accepted methodological consideration is as a prelude to examining Schwartz's contention that the filtering–pigeonholing distinction may be of some significance in establishing a processing defect unique to schizophrenia. He contrasts results from two studies of the effect of auditory distraction on schizophrenic information handling. The first study, by Hemsley and Richardson (1980), used a binaural presentation, and in the distraction condition both ears received the same simultaneous presentation of two male voices reading a prose passage. Following Broadbent (1971), it is proposed that this type of task depends on the integrity of the pigeonholing mechanism. The problem with the interpretation of this experiment, however, is that the control task (shadowing with no distraction) was not equivalent in difficulty to the distraction task. All groups performed on the control task at a greater than 90% accuracy level, whereas percentage correct for the distraction task sank to about 50–60 for normal subjects. Because the tasks are in no sense matched it is not possible to conclude in this instance that schizophrenics are *differentially* affected by irrelevant input of this type. While they probably are, this study does not provide the necessary evidence. In the second study (Pogue-Geile & Oltmanns 1980) this criticism does not apply. Oltmanns and Neale (1975) established the principle of task matching for distraction tasks, and in this more recent study, normal performance is equivalent across all task conditions. In this case dichotic presentation of the simultaneous messages in the distraction condition was used, and the cognitive mechanism under investigation is labelled filtering by both Schwartz and Broadbent. As Schwartz reports, schizophrenics did not differ from normal subjects and other psychiatric controls on the shadowing task, although it is interesting to note that after the distraction condition the schizophrenics were less able to recall the content of the relevant messages. The point that needs to be made, however, is that without completing an experiment in which tasks requiring pigeonholing or filtering are carefully matched and used with groups of schizophrenics and appropriate controls, it is premature to become too enthusiastic about defective pigeonholing as a possible explanation for thought disorder.

Distraction tasks have proved to be relatively robust and specific with respect to demonstrating schizophrenic defects, and this seems to be a worthwhile future line of research. However, this is not the only direction along which research into schizophrenic language deficits might profitably proceed. Flor-Henry (1969) drew attention to the apparent similarities between the effects of left-sided lesions in temporal lobe epileptics and the symptoms of schizophrenia. Drawing together the results of a variety of studies, he has suggested that schizophrenia is associated with alterations in the organization of the dominant hemisphere and has also proposed that affective disturbances may be characterized by nondominant hemisphere dysfunction. Much of the strongest support for this hypothesis comes from the work of Gruzelier and Venables (1974) on lateral asymmetries in the sympathetically mediated electrodermal activity of psychotic patients. Gruzelier (1979) has reported consistent lateral asymmetries in schizophrenics, which possibly reflect higher levels of arousal in the limbic system of the left hemisphere when it is in a passive state, and that these asymmetries are particularly marked in institutionalized process schizophrenics with poor prognosis. Such asymmetries are not seen in normal controls. The notion of an overactivated left hemisphere in schizophrenics has profound implications for the understanding of language disorders in such patients and provides a promising link between the bulk of the studies Schwartz reviews and the possibility he raises of an underlying information-processing defect.

Some preliminary results pertinent to this possible link are available. Researchers investigating behavioral asymmetries in schizophrenia have made use of the repeatedly demonstrated result that in normal right-handers, verbal stimuli presented to the right visual hemifield are more accurately recognized than the same stimuli presented to the left hemifield (Hellige 1975; Kimura 1973). Gur (1978), however, found that the usual pattern of asymmetries was completely reversed for right-handed schizophrenics, implying that the left hemisphere in these patients was in some way dysfunctional. Connolly, Gruzelier, Kleinman, and Hirsch (1979) similarly found more rapid processing of lexical stimuli in the right hemisphere than the left, relative to the performance of normal controls. It is important to note, however, that in this study very similar asymmetries were found in a group of psychotic depressives, undermining the specificity of the deficit to schizophrenia. Complete reversal of asymmetry has not been found in other studies using visual

presentation of stimuli (for example, Colbourn & Lishman 1979; Eaton 1979) although further (more equivocal) evidence for a dominant hemisphere deficit in schizophrenics does emerge.

In reviewing a number of studies that have focussed on ear preferences in dichotic listening tasks as an indication of hemispheric functional specialization, Gruzelier (1979) concludes that a diversity of results which defy easy synthesis has emerged. Only with particular subgroups of schizophrenic patients, with certain forms of auditory input, has it been possible to find results indicative of a left hemisphere problem. Reviewing the range of literature relevant to the hypothesis of dominant hemisphere overactivation in schizophrenia is not feasible in this context. The trends that have emerged must be interpreted cautiously, and at this time Flor-Henry's proposal can only be described as intuitively attractive. It is nevertheless a proposition that may prove to be valuable in providing a substantial bridge between changes in the patterns of verbal information processing in normal subjects and occurrence of language and communication difficulties in schizophrenia.

Language competence and schizophrenic language

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In his target article Schwartz calls attention to the *langue–parole* distinction made by Saussure (1959) and the parallel *competence–performance* distinction made by Chomsky (1965). *La langue* and *competence* refer to an abstract set of rules which all speakers of a language are presumed to know, and *la parole* and *performance* refer to realization of these rules in actual speech or writing. Schwartz finds, as have others (see Laffal 1979, p. 34) that there is no basis for believing that schizophrenic patients lack competence in their language. However, competence in a language does not ensure that the language behavior of a schizophrenic individual will fulfill the rules of the language.

That language competence is not the sole determinant of language behavior has not escaped the notice of linguists whose own thorn in the side has been poetic language. Nor, for that matter, has language deviance failed to pique such a philosopher of language as J. L. Austin (1962) who devoted considerable attention to "infelicities" in language.

Chomsky (1964) proposed an approach to analyzing such strings as *Golf plays John* and *a grief ago* on a scale of relative grammaticalness, based on the proposition that an adequate grammatical description of a deviance amounts to an understanding of it. The argument is that interpretation of deviant utterances is mediated by their reduction to the well-formed or competent structures presumed to underlie them. Katz (1964), in his discussion of deviant utterances, makes a distinction between semisentences (*SS*) and nonsense strings (*NS*). He says (1964, p. 410): "a semi-sentence is a string that has not deviated from grammaticality so far that it no longer has sufficient structure to be understood. Strings in *NS* may exhibit structure, but they do not exhibit the right sort to be comprehensible to speakers." *Scientists truth the universe* is a semisentence; *The of is likes man the* is a nonsense string.

Katz concedes, however, that some nonsense strings can be understood. He goes on to say (1964, p. 415):

> But there is nothing damaging in this admission because we do not have to say that these nonsense strings are understood by virtue of the speaker's knowledge of the structure of his language and the patterns of deviation from structural normality that preserve intelligibility . . . but rather . . . his pattern recognition skills.

In the debate that followed these propositions about deviant language, Fowler (1969, p. 76) postulated

> a unifying interpretative capability for all ungrammatical strings, independent of linguistic competence (*i.e.* not greatly dependent upon "sufficient structure"). Thus, mature, fluent, native speaker-hearers can interpret utterances of the type Katz labels *NS*. . . . Although this skill includes use of vestigial structure in cases where this exists, it has also other nongrammatical, techniques to employ.

Fowler suggests that one such technique or skill is the ability to invent nonce rules for relating deviant utterances to the grammar. As an example of the application of skills outside of the domain of linguistic competence, Fowler considers the interpretation of the E. E. Cummings line, *he sang his didn't he danced his did*. A stepwise grammatical analysis of this string converts it at best to the well-formed source sentence, *He didn't sing, he did dance*, not a very satisfactory result. However, if as Fowler (1969, p. 80) says, we "dodge into the inventive chaos of literary semantics," substituting the idea of rejoicing for *sang* and *danced*, and the noun phrases *what he didn't do* and *what he did do* for the words *didn't* and *did*, the interpretation becomes *he rejoiced in what he didn't do, he rejoiced in what he did*, or *He was happy with everything in his life, good or bad*.

Levin (1971) also takes up the question whether language competence may account for or model the understanding of poetry. He focuses on nonrecoverable deletions or deletions of words that cannot be supplied by analysis of phrase markers (stepwise grammatical analysis), since poetry often shows such deletions. The compression in *John is taller than Jack* is not a poetic compression, since [Jack] *is tall* is readily recovered from the underlying grammatical structure. Recoverability of a deletion depends on the deleted item being completely predictable, given the rest of the structure from which it has been deleted. However, in such a sentence as *John is happy; he has been working hard*, the deletion may be *because, since, although, even though*, or some other conjunction. Levin's argument is that the required deletion cannot be supplied by successive phrase-marker analysis and deletion transformation. An entirely different interpretative strategy must be brought into play, one that crosses the boundaries of sentences to take into account other relationships of form and content in the text as a whole.

These are examples of strings in which rules of grammar or semantic selection restrictions of particular words are breached, or in which omissions cannot be supplied from the structure of the sentence. However, perfectly well-formed, nondeviant statements or phrases may also be strange for entirely different reasons. Thus, there is an element of strangeness in the response of B to A:

A. *How are you?*

B. *It is cold today.*

I choose the word *odd* to characterize anomalous utterances, because it suggests an initial alert and a sense of strangeness on the listener's part, prior even to the conclusion that there has been rule deviance. In the case of poetry the listener or reader is assured of an organized plan and consistent intention which will reward efforts at interpretation. In the case of psychopathological language the listener is not assured of consistency, although neither may randomness be assumed.

What has been said about odd and rule-deviant language suggests the following picture of a speaker's understanding of language.

1. The speaker knows the rules of the language (has language competence).

2. The speaker can recognize rule-deviant language, the first reaction to which is often a sense of oddness.

3. Given an odd or rule-deviant string, the speaker-hearer employs a variety of techniques to make it understandable, such as nonce rule making, pattern analysis, and adduction of information from the context. Other methods may also be used.

The production of utterances and the understanding of utterances do not follow the same steps, although they draw on common processes. A naive process is involved in the language

oddnesses in psychopathology, which perhaps even more than the self-conscious rule deviance in poetry, may shed light on the general process of production and understanding of language. Among more recent authors, Maher (1972) has suggested that schizophrenic language is related to an attentional deficit; Cohen and Camhi (1967) hypothesized that a central selection process may be at fault; Mednick (1958) proposed an anxiety-drive theory in which remote responses come into play because they reduce anxiety; Broen (1968) proposed a theory similar to Mednick's in explaining the emergence of ordinarily weak responses; Chapman and his coworkers (Chapman, Chapman & Daut, 1976; Chapman, Chapman & Miller 1964) have suggested that in schizophrenia there is an accentuation, sometimes inappropriate, of a normal response bias.

I have found that the ideas of M. Lorenz (1957; 1961) fit the clinical phenomenon of oddness in free-flowing schizophrenic language best. She says (1957, p. 650): "[Schizophrenic] language appears to become a more plastic medium by which meaning is pursued, explored, expressed, and only secondarily, if at all, communicated." Language, for some schizophrenic individuals appears to have become a means primarily of operating upon the patient's world, but only at considerable cost to communication with others.

Despite all that has been written about it, schizophrenic language remains a puzzle. Further studies of it may be more fruitful if undertaken within the framework of an effort to understand rule-deviant language in general.

Schizophasia

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So schizophrenic speech is "a central defect in pigeonholing" (is this a cyst-producing type of CNS ornithosis?) not to be "confused" with a defect in "filtering," and therefore Schwartz's BBS target article "is not merely another literature review": Ok. Agreed also that Noam Chomsky has read Ferdinand de Saussure very attentively (although de Saussure thought that Hélène Smith's behavior was interesting, Flournoy 1900) and that schizophrenic speech is neither a disease of *langue* nor a disease of competence (my impression is that someone with a disease of competence could only moan or shut up, or at least should). Also agreed: The study of schizophrenic speech has so far been "flawed by errors in experimental method" and by "methodological weaknesses"; however, it does not strike me that this will be entirely corrected by asking "several colleagues" to rate, "on a five-point scale ranging from 'schizophrenic' to 'normal,'" four "excerpts taken from several published conversations" (including one from a familiar individual regarded by some as psychotic). On the other hand – and I indeed consider this to be one of the strong points of Schwartz's paper – I learned with great interest that making a diagnosis of schizophrenia is neither more nor less difficult than making a diagnosis of appendicitis: One should reflect on this fact, as Schwartz does.

Now, in 1864, Trousseau coined a word, "aphasia" (Hécaen & Dubois 1969) which has proved useful; and some 30 years later, Kraepelin (1896) coined another word, "schizophasia," which – in my opinion – has also proven useful. Although I will be adding an "s" at the end of each, I will thereafter be using those two words; and I do not agree that whether or not the latter designates a subvariety of the former "remains problematic" (see infra).

If I were asked to answer Schwartz's question – Is there a schizophrenic language? – my answer would be that I do not know. Nonetheless, I would find it appropriate to formulate a number of comments, all of them having to do with spontaneous language production (i.e. disregarding metalinguistic data):

a. One can describe, in linguistic terms, various types of linguistic deviations that can be observed to occur both in the aphasias and in the schizophasias. With the exception of phonetic disintegration (if one is not drunk), similar deviations can also be observed to occur in the discourse of standard speakers, as nearly everybody working in the field has emphasized. Whether or not such deviations are deliberate, and whether or not they are the manifestations of a thought disorder, or else of a language disorder, is not relevant in the present context. On the other hand, although the deviant utterances of aphasics, schizophasics, and standard speakers are not qualitatively different (Fromkin 1975; Lecours & Vanier-Clément 1976), there exist interesting quantitative differences, such as predominance of phonemic deviations in conduction aphasis and in a particular type of poetry, or predominance of word choices primarily determined by paradigmatic formal or semantic kinship (rather than by a conventional topic) as in glossomanic schizophasia (Navet, Lavallée-Huynh, Lecours 1982) and in another particular type of poetry, and so on.

b. Just as there exist several clinical types of aphasia there also exist several clinical types of schizophasia. I have personally observed two of the latter, but I would not be surprised if several others remained to be described. The first – and best known – is the glossomanic type mentioned above, and it seems to me that this is the type in which Schwartz is interested; as far as I know, it is (or has become, with the increasing use of new drugs) very infrequent; when they attribute a clinical label to psychotic patients whose speech production is of this type, psychiatrists (and their equivalents) sometimes talk of schizophrenia, sometimes of mania. The second type that I have observed is glossolalic schizophasia; this is characterized by fluent, entirely (or nearly entirely) neologistic-discourse-like behavior (produced without articulatory distortions); it is also infrequent (among diagnosed psychotics), and has been observed in patients considered by their doctors to be schizophrenics (Bobon 1952; Cénac 1925; other references; Lecours 1982). Had he been interested in this particular type of "schizophrenic speech," Schwartz might not have decided to reject the Markovian hypothesis as peremptorily as he did. (I do not know who coined the word "glossomania," but I do know that it was coined long ago, and I think that the word "glossolalia" was coined by Saint Paul, perhaps on the day of the first Pentecost, and conceivably under the influence of both the Holy Ghost and good wine.)

c. If you are a neurologist of the French or the German school, that is, if you think that the anatomoclinical method has been and remains a fundamental source of knowledge in the field of neurolinguistics, you are not likely to consider schizophasia "the result of aphasia." If you are not, you might still argue that organic brain disease is not likely to cause the creative, severe overuse of morphosyntactic rules such as those of derivation, composition, nominalization, and so forth, which constitutes the main characteristic of glossomanic schizophasia (Navet et al. 1982; Lévi-Valensi, Migualt & Lacan 1931). Of course, one might also wish to suggest a new definition of aphasia, which might in turn be the topic of another BBS target article.

Schizophrenic language: An ephemeron hiding an ephemeron

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Schwartz, like many other scholars interested in "schizophrenia" rather than in the "concept of schizophrenia," has labored

hard to find a fragile thread to tie the putative disease to that annoying way of communicating which sometimes – but not always – earns one the label "schizophrenic." His review of the literature provides yet another example of the long string of failures (see Sarbin & Mancuso 1980) to discern linkages among the investigations of those people called schizophrenic. Schwartz nonetheless attempts to bind together a mass of contradictory findings with the most gossamer of threads. "It is plausible that lying at the basis of these problems is a central defect in pigeonholing (adopting a response set)." In other words, his effort was strenuous, the findings were inconclusive, and the weak interconnecting nomological net is "plausible." Schwartz half-heartedly agrees with this assessment when he presents his final equivocating sentence, "We may never be able to explain the schizophrenic language deficit because it probably doesn't exist." We shall propose that his doubts about the supposed language deficit should extend into our thinking about the basic concept, schizophrenia.

The elusive variable, schizophrenia. In another place (Sarbin & Mancuso 1980), it has been noted that in the typical study that uses the concept schizophrenia, the presence or absence of the label provides investigators with the means of delineating the predictor variable. In language studies, for example, the investigator tries to establish the presence or absence of a language anomaly – the predicted variable – in relation to the presence or absence of schizophrenia – the predictor variable. The effort promotes the inference that the specific language anomaly is caused by schizophrenia, the presence of which had been established through the judgment of an expert diagnostician. This practice, aside from being tautological, violates the basic tenets of mechanist science. Mechanistic metaphysics would dictate that there be independent validation of the entities in a causal relationship. Considering, however, that the diagnostic process is a social judgment process, it becomes apparent that the predictor variable in these studies is established by polling. For example, a polling process, vividly described by Spitzer, Williams, and Skodol (1980), established the diagnostic criteria for DSM-III. Furthermore, as diagnosis is currently practiced it can be nothing other than a moral judgment. An expert determines that the bothersome conduct that encouraged significant others to take action indeed is present, that it is bothersome, and that the actor may be awarded the label schizophrenic.

Schwartz does note the centrality of the outcome of this judgmental process, relative to the matter of schizophrenic language. He notes that to make this moral judgment, in the first place, the judge determines that the putative patient, among other things, has failed to speak appropriately. Thereupon investigators search for a specific language deficit, as if to validate the original moral judgment masked as diagnosis. A qualitative assessment of the sought-after deficit would then replace fallible moral judgments made by diagnosticians. As close examination of scores of reports reveals (Sarbin & Mancuso 1980), the research efforts have failed to produce one single variable that could replace the "diagnostic" process. It is not atypical, as Schwartz shows with the search for a language deficit, that investigators fail to replicate each other's findings. In the face of these constant failures we are encouraged constantly to reconsider the judgment process.

In considering the judgment process, Schwartz discusses interrater reliability and concludes that despite shortcomings, the level of reliability "compare[s] quite favorably with those achieved in other branches of medicine." Showing further that he is ineluctably committed to applying a disease model to the study of inappropriate discourse, Schwartz provides the following metaphoric rationale: "Pathologists may have difficulty deciding whether a particular tissue sample is malignant, but no one has argued that this means that cancer does not exist." We deduce that Schwartz intends that this disjunctive logic chain be metaphorized to read, "Diagnosticians may have difficulty in judging the presence of schizophrenia, but we need not argue that schizophrenia does not exist." The flaw in the metaphor, however, is immediately apparent. The test of the predictive validity of the judgment of "malignancy" is delivered by the "natural" course of events. The test is an external validational test. It is not a closed circle of interrater reliability measures. To date, no external test of validity has been applied to schizophrenia (see Grove, Andreasen, McDonald-Scott, Keller & Shapiro 1981). The assignment of the "valid diagnostic label" remains a self-contained and repetitive social judgment process (Helzer, Robins, Taibleson, Woodruff, Reich & Wish 1977; Spitzer, Endicott & Robins, 1978; Spitzer & Fleiss 1974; Spitzer et al. 1980). Without valid predictor variables it is fruitless to overextend the illness model – a mechanistic model which once successfully guided the biological sciences – into explanations of unusual conduct in discourse.

Studying language. As Schwartz's review illustrates, the conceptions of language that have guided the study of schizophrenic language also had their base in mechanistic paradigms. Radical associationism held the field at the time when behavioral scientists began to conduct studies of the schizophrenic language deficit. In associationist models, at their simplest level, one word in a discourse served as the stimulus for the ensuing word. One word, in other words, served as the cause of the next word. Schwartz rightly points out that studies of associative functioning, built on one or another variant of the simplistic cause-effect chaining principle, could not, in any way, be useful to explain speech in a social context. "In natural speech, the pronunciation of a word, its meaning, and its syntactic [and semantic] role can only be determined by an analysis of the context in which it occurs." We have inserted the term semantic into Schwartz's declaration, because we cannot overlook the immense implications of the work (Jenkins 1974; Olson 1970, Rommetveit 1974) that has shown that meanings of word strings are also determined by the context in which they are uttered.

Having recognized that understandings of language are best incorporated into contextual models, investigators may turn attention to the immense advances that cognitive scientists have achieved in this realm. One can draw from this work to declare some basic assumptions that provide a foundation from which to study unusual discourse patterns. Two principles are especially relevant to this discussion. (1) The inner representations of the world – the construction systems – which guide a participant's discourse processing must be considered as a central strand in the communicative context. (2) Communication depends on the participant's ability to engage in a social process – that is, playing a role in a communication requires that a participant take into account the construings of other participant(s) as he processes that discourse. At the base of these assumptions is a third required, but not trivial, assumption: (3) One's construction system, including that part of the system by which one construes the constructions of others, is developed through interactions with the world of events – particularly social events.

Current emphasis on studying the cognitive bases of communication encourages scholars to recognize that language use is but one inextricably interlinked part of the much wider realm that might better be discussed as "discourse processing." A person is better regarded as a processer of discourse, rather than as a "decoder and encoder of language." With these points fixed, let us reconsider the issue of schizophrenic language.

Why study schizophrenic language? The study of schizophrenic language began when scholars undertook to discuss improper conduct in discourse processing. As Schwartz once again shows, mechanistic conceptualizations have failed to illuminate this bit of unwanted conduct.

The following points supplement the foregoing critique: Studies of "schizophrenic language" limit the context of a discourse-processing situation. By an effort to uncover a context-free deficit, investigators remove sources of environmental feedback which are central to a discourse. In that context is

crucial to the process, studies completed in this way cannot be accepted as studies of discourse failure. In addition, when there is a focus on the "disease" of the target person, investigators are encouraged to ignore the place of the judge in the discourse process. Scientists are not expected to explain the judge's failure to process the target's communications. The scientists' task, since they study a disease rather than a discourse process, is to explain the failures of the "patient."

What should be our direction? In the presence of failed paradigms we are encouraged to ask, Why should we continue to use our chosen explanatory paradigm? In the case of our topic of concern the latter question may be elaborated into, Why should we continue to use the disease model of the mechanistic paradigm to explain a function – discourse processing – which was not amenable to mechanistic explanation?

As representatives of our current society, scholars have developed an interest in explaining the perplexing conduct that may be judged as failures in discourse processing. Our society willingly supports efforts to develop explanations. Scholars (Posner & Hanson 1980; Van Dijk 1980) have provided very useful conceptions of discourse processing. In addition, other scholars (Magaro 1980; Rommetveit 1974; Tschudi & Rommetveit 1982) have stressed the place of disrupting communication patterns in those social interactions that lead to and surround the "diagnostic situation." One may find ample foundation from which to develop explanations of failures in discourse processing. There is no need, from this perspective, to study the elusive intermediary variable "schizophrenia" as a means of explaining troublesome discourse processing.

What is language?

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I would like to comment briefly on Schwartz's definition of language and the use he makes of it in determining that a schizophrenic language deficit probably does not exist. Throughout the paper Schwartz assumes a model of language in which, following Chomsky, a clear line is drawn between competence and performance: Competence is defined as an individual's knowledge of an abstract set of phonological, syntactic, and semantic rules, and performance as the use of this and other relevant knowledge in speech production. Schwartz's position is that everything that has been shown to distinguish schizophrenic speech from that of other people is an aspect of performance, not competence, and that therefore there is no such thing as a language of schizophrenia.

Now the way in which Chomsky distinguishes competence and performance has come under almost continual attack in linguistics since it was first formulated. The two most telling criticisms are that (1) it idealises language, treating as deterministic and categorical rules what is in essence a set of probabilistically weighted tendencies; and (2) it trivialises language, relegating to a theory of performance many aspects of language that are essential to its function as a semiotic system. Criticism 1 has been articulated most forcefully by Labov and other variation theorists who have demonstrated in numerous studies (e.g. Labov 1972a; 1972b) that linguistic rules are probabilistic in form, and must be so formulated to account for the systematic variation found in natural speech. Criticism 2 has been advanced by linguists interested in discourse who argue that knowing how to use a language is part of knowing that language, and that for this reason competence must either be reinterpreted as "communicative competence" (e.g. Hymes 1971) or abandoned altogether (e.g. Halliday 1978).

Both of these criticisms are directly relevant to Schwartz's paper. First, the question of categoricality: On several occasions in the paper Schwartz dismisses characterisations of schizophrenic language on the grounds that similar behaviour is found in the language of other speakers. For example, Chaika's description of aphasiclike abnormalities is dismissed because normal speakers occasionally make similar mistakes; and Rochester's account of unclear reference is dismissed because young children and normal adults sometimes fail to identify participants in discourse correctly. These dismissals depend on the assumption that quantitative differences between schizophrenic and other language are not qualitative – that the only way in which schizophrenic language can be distinguished is with categorical rules. This assumption is highly questionable. Considered in light of Labov's work it would entail, for example (among other absurdities), treating social dialects as a *performance* feature! It may well be that differences between schizophrenic and other language are probabilistic ones. But it does not follow that these do not reflect a qualitative difference in the system that produces them, unless one idealises language in Chomsky's characteristically categorical way.

Second, the question of "communicative competence": Schwartz refers at several points in his paper to semantics and pragmatics, and he once again appears to be taking a very Chomskian view of what these levels describe. Semantics has always been rather vaguely defined within this paradigm, but when it is defined (e.g. Kempson 1975) it is usually in terms of truth functional relations between *sentences* and some possible world. Note that sentences and not texts are taken as the basic semantic unit. This effectively places discourse structure outside language – it is not an aspect of competence in this Chomskian view. This position has been challenged by many schools of linguistics since at least 1968 (see Gleason 1968; Van Dijk 1972); it is pointed out that, after all, people talk to each other in texts, not sentences, and that language is elaborately structured to accomplish this (see Halliday & Hasan 1976 for one account of this structure in English). As argued in Rochester and Martin (1979), language failure in schizophrenia is essentially discourse failure – and this is reflected in the analyses of cohesion and reference in schizophrenic speech presented there. Once again, schizophrenic speakers are quantitatively, not categorically, different from other speakers. But once the text, rather than the sentence, is taken as the fundamental unit of semantic analysis, these differences can be interpreted qualitatively and used to distinguish schizophrenic speech reliably from normal speech. Schwartz does not discuss these results, presumably because of the very narrow, sentence-oriented view of linguistic semantics he is adopting.

Pragmatics is very clearly outside language proper for Schwartz, and in this most linguists would probably agree. Even those linguists who are most concerned with the relation between language and social context see pragmatics, or, to use the Firthian (see Gregory & Carroll, 1978, for a representative Firthian approach to register analysis) term, register, as realised through, rather than as a level of language. Having granted this, however, it is important to be cautious about assuming that studies of pragmatics are thereby essentially sociological or psychological in nature. For one thing, some linguists (e.g. Halliday 1973) have argued that the ways in which language is used have so influenced its own internal structure that (1) this structure cannot be studied apart from consideration of its use; and (2) very strong predictions can be made about the kinds of meaning that are at stake in particular situation types. For another, it is possible to interpret pragmatics itself as a semiotic system – a language realised through language. For both reasons, descriptive strategies developed by linguists for analysing language are essential if an adequate account of pragmatics is to be given; a purely cognitive approach to language processing is certain to be inadequate.

In short, then, there is a danger is assuming that what is quantitative cannot be qualitative; that what is not phonology, syntax, or sentence semantics is not language; and that what is

not language is not semiotic. As linguistics grows out of its reclusive Chomskian shell, much of what Schwartz considers extralinguistic phenomena may well turn out to be linguistic after all. Recent research into variable rules, discourse, and register is already showing this to be that case. It will be unfortunate indeed if researchers in the language of schizophrenia allow the eroded model of language that Schwartz assumes to obscure these results.

The language of schizophrenic language

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Schwartz presents a thesis about the existential status of schizophrenic language and a review of the literature which he feels supports his theory. The review of the literature actually deals with attempts to discover the cognitive deficit (or deficits) that seem to mediate the phenomenon known as schizophrenic language. The strangeness of schizophrenic language has fascinated many investigators and has therefore been studied extensively. Because of this there exists a voluminous body of literature in this area. Schwartz attempts to bring some conceptual order to our understanding of schizophrenic language. The main thrust of his thesis is that there is probably no particular linguistic deficiency in schizophrenics, but only a verbal production problem.

Schwartz is to be especially commended for his excellent and scholarly literature review. Few such reviews can be definitive, however, and Schwartz has not exhausted the available materials. One must be selective in preparing a review because of the limits of space, the press of time, and the quantity of available materials. Therefore some subjects must of necessity be deemphasized or ignored. However, the writer does exercise some editorial judgment as to the importance or relevance of materials. Some of the topics not dealt with by Schwartz are the relationship between psychotropic drugs and schizophrenic language, schizophrenic language variability among different diagnostic groups, the conditions relating to the waxing and waning of schizophrenic verbalization, the operation of language deficits in schizophrenic children, longitudinal changes in schizophrenic language, and neuron biochemical activity correlates of disordered language.

Each of the topics that Schwartz does review is germane to his general thesis about schizophrenic language. He finds that for each of his topic areas, there is no clear evidence to demonstrate the existence of language deficit in schizophrenia. I should point out that the failures described by Schwartz are only failures to pinpoint clearly a definitive single language deficiency in schizophrenia. I would also state that these failures do not imply that language deficits are therefore nonexistent, but only that the nature of the deficits may be a great deal more complicated than originally suspected. Schwartz's conclusion about the nonexistence of schizophrenic language is also bolstered by his own particular definition of "language." The limitations of his definition are examined later.

I feel that there was one important omission from the catalog of possible cognitive deficits underlying schizophrenic language. I am referring to the early, but unfortunately neglected, work of Norman Cameron (1938; 1944) and Paul Federn (1952). They arrived at their conclusions from different avenues of investigation, Cameron's work having been experimental and Federn having relied on clinical observation. Both of these investigators attribute the peculiarities of psychotic language to a lowered level of energy in the schizophrenic. They feel that the adequate organization of thought and its verbal manifestations uses a great deal of energy (i.e. one expends effort in framing thought and then speech into precise forms and then further shaping them for communicative purposes). They argue that the schizophrenic is operating at a lower energy level than the nonschizophrenic, and, therefore, does not have the resources for careful and precise linguistic construction. The schizophrenic's language is full of approximations of precise words. The schizophrenic will also use any substitute phrase rather than expend the effort to find a precise word because the use of the former makes less demands on his psychic economy than the latter. Intrusions occur because the schizophrenic does not have the energy to focus on one particular problem area by blocking out extraneous stimuli. In short, he does not have the resources needed to attend and concentrate; consequently, personal and irrelevant material from outside the problem area cannot be resisted and leaks into his thoughts and verbalizations.

Cameron and Federn hypothesize that the so-called schizophrenic verbal garbage is the result of the schizophrenic's low capacity to control his mental operations. Cameron (1938; 1944) has presented some persuasive evidence to support this contention.

I also felt that Schwartz neglected the motivational basis for schizophrenic language. He has described processing deficits but has for the most part ignored views dealing with schizophrenic language as a "defense" strategy. Sullivan (1953) has argued that some inadequate individuals may develop schizophrenic language in order to ward off contact with other human beings. The personality theorists have argued that the mainsprings of most kinds of schizophrenia are a desire to withdraw from or minimize contact with other humans. Strange language or "crazy talk," besides making meaningful communication difficult, also serves to frighten and alienate others. This is the basis of Sullivan's argument that motivation plays a critical role in the appearence of schizophrenic language. Sullivan's views may account for the variability of schizophrenic bizarreness (i.e. it is a function of the level of threat intrusion from the human environment). The motives behind the appearance and use of schizophrenic language need to be taken into account in any comprehensive understanding of this puzzling phenomenon.

The main conceptual focus of Schwartz's paper is schizophrenic language. He poses a question about the existence of schizophrenic language and concludes his paper with the opinion that "we may never be able to explain the schizophrenic language deficit because it probably doesn't exist." This conditional negative answer to his question is derived less from data and more from the development of a restrictive definitional system that appears early in his exposition. He defines language as only linguistic rules (a "set of semantic, syntactic, and phonological rules"). He implies that thought and speech are semi-independent ("Thought is reflected in speech, but it is not the same phenomenon," "Thought . . . can be studied independent of verbal productions"). He then separates language from speech, with the latter defined as verbal production. He also argues that schizophrenics can be linguistically competent but still be incoherent because only their speech is disorganized and not their language. If one accepts Schwartz's restricted definitions, then this last allegation is logically possible, although psychologically puzzling.

Why should speech be disordered if linguistic rules are intact? Schwartz quite correctly points out that speech is a product of other factors besides linguistic rules and that many individuals may have disordered speech on various occasions. This, he claims, can occur without the presence of linguistic rule deficiency. Individuals under the effects of great stress, high fevers, intoxication, and the like may have disoriented speech. However, the fact that nonschizophrenics may have disoriented speech does not demonstrate that schizophrenics have an intact linguistic structure. Schwartz's observations may also be used to argue that disorganized speech in normal individuals actually implies a temporary failure in linguistic structure. Schwartz also points out that schizophrenics are often coherent. This observa-

tion cannot be used to logically substantiate the presence of their intact linguistic structure, but only to show that linguistic integrity in schizophrenics is unstable. The problem is that thinking and speech stand in a complicated relationship to each other. To separate them and treat them as quasi-independent phenonema invites conceptual difficulties. "Thought can proceed without speech," but can speech then also proceed without thought?

We learn from the close and intimate relationship between speech and thought because the former is the prime clue to the nature of the latter. It is mainly from verbal productions that we reconstruct the operations of the thought processes. We only know about the existence of schizophrenic thought from the schizophrenic's strange utterances and behaviors. If we consider thought, speech, and language as independent phenomena, then we have no rational methodology for studying schizophrenic thought. We must assume that thought and speech are different manifestations of the same superordinate process. As such, they can serve as indices of one another. The physicist assumes a correlative identity between the observed measure of heat and the activity of molecules. He can do this because in his conceptualization of the physical world, he assumes that temperature has an invariant correlative identity with molecular activity. I am saying that speech and thought also have an invariant correlative identity. They are different facets of the same process and contribute, along with other processes, to an even more comprehensive phenomenon – language. Only through a trivialization of the definition of language can Schwartz reach his conditional negative conclusion about the existential status of schizophrenic language.

Language involves a much more complicated process than simply following linguistic rules. It *is* linguistic rules. But it is also verbal and nonverbal behavior. It is also thought. It is also a desire to communicate. It is also perception and evaluation of the external and internal environments. It is also biochemical activity in the neurons. It is all of these and more. Language is a superordinate, multilevel phenomenon in which constituent processes operate simultaneously and are interdependently and constantly affecting each other. We are, of course, woefully ignorant about the character and operations of all of the multilevel events in language, and this is especially true for the configurations occurring in schizophrenia. But the ultimate proof of the existence of schizophrenic language is that we have schizophrenics who think, talk, and act strangely, and attempts to deal with only one of these aspects of their illness leads to failure.

I would like to conclude by pointing out that Schwartz himself finds it difficult to adhere to his limited definition of language. When summarizing his conclusions about the effects of pigeonholing deficits, he wonders whether future research will show how this "information-processing deficit produces the *peculiar language* associated with schizophrenia" (italics added). If he had adhered to his own definitional system, he would not have framed his question in the way that he did, since, by his own definition, such a deficit could only affect "speech" and not "language." It could be argued that the above quote illustrates both the difficulties inherent in Schwartz's definitional system [and his own full acceptance of it].

Schizophrenic information-processing deficit: What type or level of processing is disordered?

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Investigators of schizophrenic disordered speech have increasingly emphasized the role of fundamental information-processing deficits as the source of characteristic schizophrenic speech peculiarities and low communicability (Cohen, Nachmani & Rosenberg 1974; Maher 1972; Rochester 1978; Rochester, Martin & Thurston 1977). Schwartz has strengthened these observations by persuasively integrating the lack of convincing evidence for a deficit in schizophrenic language *competence* with the positive evidence of deficits in schizophrenic speech *performance* and in certain information-processing tasks. However, the particular type of information-processing deficit that he concludes is characteristic of schizophrenic disorder, involving Broadbent's (1971) pigeonholing or response set, does not accommodate certain bodies of existing data.

Broadbent's (1971) association of filtering with changes in the signal-detection sensitivity index (of which d' is one example) emphasizes that filtering involves a change in the quality of information transmission for certain stimuli in the early processes by which physical stimuli are transformed into internal states of evidence. Alterations in sensitivity are independent of shifts in β, the response criterion measure that Broadbent associates with pigeonholing, which influences the later transformation of internal evidence states to category states and responses. Yet some studies have demonstrated that schizophrenic patients show lower than normal sensitivity for auditory stimuli as measured by either d' (Rappaport, Hopkins & Hall 1972) or an analogous technique, accuracy within a forced-choice detection task (Emmerich & Levine 1970; Levine & Whitney 1970). The former study shows a sensitivity deficit among schizophrenic patients for pure tones in background noise that parallels the impaired detection of visual patterns in simultaneous visual noise found among schizophrenic patients (Stilson & Kopell 1964; Stilson, Kopell, Vandenbergh & Downs 1966). Recent tachistoscopic studies have also shown that single letter stimuli in a forced-choice task must be presented at a longer duration for poor prognosis schizophrenic subjects to achieve the same level of detectability shown by normal, depressed, manic, or good prognosis schizophrenic subjects (Braff & Saccuzzo 1981; Saccuzzo & Braff 1981).

These findings suggesting impaired perceptual sensitivity among schizophrenic patients (at least for some subgroups) in signal detection tasks have recently been extended to children born to a schizophrenic parent, a group at heightened risk for adult schizophrenia. Using adaptations of a visual vigilance task involving monitoring a series of similar stimuli (the Continuous Performance Test), overall d' level was found to be lower than normal among children of a schizophrenic parent (especially in a deviant subgroup) in a version requiring short-term memory (Rutschmann, Cornblatt & Erlenmeyer-Kimling 1977) and in one requiring only recognition of a single degraded numeral (Nuechterlein 1982a; 1982b). Response criterion level (β) did not differ from the normal level among the children born to schizophrenic mothers, although it was significantly lower than normal among hyperactive children (Nuechterlein 1982a). The sensitivity deficit among these children of schizophrenic mothers suggests that this difficulty might be linked to vulnerability to schizophrenic disorder. Thus, both schizophrenic patients and their offspring have been found to have lower sensitivity in various signal detection and vigilance tasks, which appears to be inconsistent with the suggestion that deviant pigeonholing associated with altered β accounts for the information-processing deficit in schizophrenia.

Although involving sensitivity deficits rather than response criterion differences, most of the foregoing results do not involve deviant sensitivity shifts within the task or discrimination of relevant and irrelevant stimuli on the basis of a single common physical characteristic (Broadbent's filtering). They might, therefore, be construed as falling under a very broad conception of defective pigeonholing, although faulty transformation of stimuli into internal states would appear more likely. Other results involving selection based on such a physical characteris-

tic also reveal impairment of information processing in schizophrenia, however. Performance under conditions of distraction in which the distractor is distinguished by a clear physical characteristic has in some cases been associated with greater performance deficit among schizophrenic patients than normal subjects. Walker (1981), for example, found a significant deficit in visual target detections among schizophrenic patients, as compared to schizoaffective and affective disorder patients, during an auditory distraction condition of the Continuous Performance Test. The performance of the groups did not differ significantly without distraction. Although the enhanced differential deficits of schizophrenic patients under such distraction conditions may sometimes be attributable to greater psychometric discriminating power accompanying more optimal task difficulty level, Oltmanns and Neale (1975) demonstrated that schizophrenic short-term recall is abnormally vulnerable to distraction even when the difficulty level of neutral and distractor conditions is equated for normal subjects. Schizophrenic impairment attributable to distraction in this study reflects a failure in filtering in Broadbent's terms, because the distracting effect occurs despite a clear physical difference (sex of voice) between the relevant and irrelevant stimuli.

A distinction between automatic processes and those that are controlled and involve processing capacity (Posner 1978; Shiffrin & Schneider 1977) may be more useful for characterizing the nature of schizophrenic information-processing deficits. These information-processing models posit that the encoding process (transformation of physical stimuli into internal codes) is normally automatic, requires no processing capacity, and occurs outside of conscious awareness. Thus, a more passive process of encoding is proposed, rather than the active early selection of Broadbent's (1971) filtering. Posner (1978) and Shiffrin and Schneider (1977) use the term "attention" in the sense of processing capacity. Controlled processing (Shiffrin & Schneider 1977) or conscious attention (Posner 1978) involves demands on limited processing capacity, is under subject control, and usually involves a limited serial comparison rate.

A deficit in controlled processing in schizophrenia and a relative absence of deficit in automatic processing has been proposed by Oltmanns (1978), Neale and Oltmanns (1980), and Callaway and Naghdi (1982). Oltmanns (1978) found support for this hypothesis by demonstrating that auditory distraction interfered with schizophrenic short-term recall of a string of words primarily by reducing recall for items early in each word string. Since recall for such words is more dependent on active rehearsal, whereas recall of items late in the string normally involves more passive automatic processes, the short-term memory deficit of the schizophrenic patients during distraction apparently reflects deficient active, controlled processing. A parallel finding among children of schizophrenic mothers has recently been reported (Harvey, Winters, Weintraub & Neale 1981).

Whether this alternative hypothesis regarding the nature of schizophrenic information-processing deficit is more adequate than the pigeonholing deficit favored by Schwartz depends partially on the future exploration of deficiencies among schizophrenic patients in encoding and other normally automatic aspects of information processing. The data cited earlier regarding perceptual sensitivity in signal detection and vigilance tasks suggest that the transformation of physical stimuli into internal codes may be faulty or inefficient in schizophrenic patients and in some of their offspring, especially when the target stimuli are ambiguous. However, it is as yet unclear whether these deficits represent malfunctions in the normally automatic encoding processes or in the additional controlled serial comparison processes that some theorists (Shiffrin & Schneider 1977) believe are required in situations of incomplete or ambiguous automatic encoding.

A possible alternative to the view that defective controlled processing is the central information-processing deficit in schizophrenia should be considered, however, in light of these suggestive results on perceptual sensitivity. If normally automatic processes such as encoding and highly overlearned behavioral sequences become deautomatized in schizophrenic disorder, as some subjective reports suggest (McGhie & Chapman 1961), processing capacity may be devoted to these deautomatized operations and deflected away from other processes to which it is normally allocated. If this reallocation of processing capacity is sufficient, the deautomatized operations (e.g. encoding to recognition) may be completed successfully at the cost of controlled operations at other levels (e.g. active rehearsal). This alternative conceptualization would account for the results of Oltmanns (1978), for example, but would place the basic problem in the realm of normally automatic processes rather than controlled processes.

These considerations support the emphasis on information-processing deficit in schizophrenia adopted by Schwartz, but suggest that other conceptions of the nature of these deficits may yield more productive ties to the disorders of schizophrenic speech.

Criteria for evaluating hypotheses regarding information processing and schizophrenia

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There is, as Schwartz suggests, considerable evidence indicating that schizophrenics perform differently from other people on laboratory tasks designed to tap various facets of information processing. This is particularly true if the schizophrenics are either hospitalized or acutely symptomatic and if the comparison group is not psychologically disturbed. The data involving comparisons between schizophrenics and other psychiatric patients (particularly patients with bipolar affective disorders) are less consistent, and comparatively few studies have examined schizophrenics during residual phases of recovery. Nevertheless, many investigators agree that some form of information-processing difficulty is characteristic of schizophrenia, or of some subset of schizophrenic patients (Neale & Oltmanns 1980).

The consensus also seems to be that schizophrenics are able to use syntactic rules and structures in processing verbal information (e.g. Straube, Barth & König 1979), although this ability may be disrupted in the presence of verbal distraction (Oltmanns, in press). If schizophrenics are linguistically "competent," then a reasonable explanation for their occasional failure to communicate effectively may involve the interface between their knowledge of the language and their information-processing skills, as Schwartz and others have suggested (e.g. Maher 1972; Rochester 1978).

Beyond these very general conclusions, there is considerably less agreement about the nature of cognitive functions in schizophrenia and their relation to the development of the disorder. For example, the specific nature of schizophrenics' problems in information processing is a matter of dispute. Some results are consistent with the hypothesis advanced by Hemsley (e.g. Hemsley & Richardson 1980) and Schwartz that schizophrenics experience special difficulties with tasks that require "pigeonholing." Other evidence seems better explained by the notion that schizophrenics are inefficient in the area of controlled, serial processes (Callaway & Naghdi 1982; Oltmanns 1978). Consider the studies by Pogue-Geile and Oltmanns (1980) and Hemsley and Richardson (1980). The former study found that verbal distraction did *not* affect schizophrenics' ability to shadow a prose passage, but the latter study did find such an effect. Schwartz points out that this difference in results may be

attributed to the manner in which the relevant and irrelevant messages were presented (i.e. whether they were presented to separate ears or simultaneously to both). This hypothesis is both reasonable and testable. But it doesn't seem to provide a complete account of all the phenomena observed in our study. Although distraction presented to an alternate ear did not affect the schizophrenics' shadowing performance, it did interfere with their subsequent ability to recall the content of the relevant passage. This aspect of the data is more easily handled by the notion of a disruption in some aspects of controlled information processing.

The results of another recently completed study (Frame & Oltmanns 1982) are also relevant to Schwartz's argument. The task in this study was identical to that employed by Pogue-Geile and Oltmanns, but the messages were presented differently: The relevant message was presented by a female voice and the irrelevant message by a male voice, but both were presented simultaneously to both ears. According to Broadbent's (1971) theory, their separation should still depend on the filtering process (because they were separated by a physical cue), and according to Schwartz's hypothesis we should still expect that distraction would not affect the schizophrenics' shadowing performance. But it did. In contrast to our previous results, distraction interfered with the subjects' ability to shadow the relevant message, but it did not affect their subsequent recall of its content. Although the comparison of results across studies is complicated by a number of factors, the general pattern of results is perhaps most consistent with a suggestion made by Knight and Russell (1978), who argued that schizophrenics may suffer from a *general* reduction in the global capacity to process information. According to their argument, the specific manifestations of this global deficiency will vary as a function of task demands.

Given the enormous complexity and seemingly infinite flexibility of human cognitive functions, and the well-known heterogeneity of schizophrenia, it seems unlikely that we will find a specific, uniquely schizophrenic deficit in information processing. Various competing hypotheses are nevertheless useful to the extent that they lead to further understanding of the similarities and differences between the cognitive abilities of schizophrenics and other individuals, and to the extent that this knowledge is then systematically embedded in a network of empirical relationships with other features of the disorder. As Neale and I have argued elsewhere (Neale & Oltmanns 1980; Oltmanns & Neale 1978), the latter point is particularly important. Cognitive research that has focused on simple group comparisons between schizophrenics and control subjects (particularly in the absence of other specific psychiatric groups) has had a limited impact on our understanding of the development of schizophrenia. Schwartz's hypothesis has the capacity to generate more specific predictions than those that involve cross-sectional, group comparisons, and psychological research regarding schizophrenia has reached a point where such notions should be evaluated in terms of more stringent criteria. I would like to emphasize two. First, it should be demonstrated that within the general group of patients who are considered schizophrenic, a relation exists between impaired information processing (in this case a pigeonholing deficit) and overt problems in verbal communication (e.g. Maher, Manschreck & Rucklos 1980). Since not all schizophrenics exhibit speech problems, Schwartz's hypothesis should predict that those patients who perform poorly on tasks designed to require efficient pigeonholing are also most likely to be considered "thought disordered" on the basis of their verbal communication. Second, for those patients who exhibit problems in information processing as well as speech anomalies, the temporal relation between these problems should be determined. If information-processing problems are responsible for discourse failures, and if the latter are episodic phenomena (as they seem to be), then an exacerbation of information-processing problems should coincide with, or precede, the appearance of speech problems that are characteristic of schizophrenia. Conversely, periods of symptomatic remission should be accompanied by the recovery of more adequate cognitive functioning. Of course, a somewhat different pattern would be expected if impairments in information processing are considered to be characteristic of a genetically transmitted vulnerability to schizophrenia, in which case they should be relatively stable phenomena (Zubin & Spring 1977).

Several years ago, Maher (1966) made the following observation regarding the literature on language and thought in schizophrenia: "Hypothesis struggles with hypothesis in a conflict in which new contenders enter the field but the defeated never retire" (p. 433; also quoted in Rochester & Martin 1979). Perhaps in the expanded context of longitudinal data and an analysis of the relationship between performance on laboratory tasks and overt communication difficulties, less useful hypotheses will finally be discarded.

Aphasia as a model for schizophrenic speech

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Schwartz concludes, "With more research we may be able to characterize the deficit responsible for schizophrenic speech." According to his criteria, aphasics show a deficit in "speech" as well as "language." He argues that while schizophrenics commonly manifest aberrant "speech," they have not been shown to have abnormal "language." His review correctly notes that prior research into this problem has been bedeviled by two weaknesses: first, a failure to define adequately what is meant by "abnormal language," and second, the absence of a precise definition of schizophrenia. Schwartz notes the difficulties in diagnostic reliability in schizophrenia research. He is kind in not concluding that much of the early work on schizophrenic language is vitiated by inadequate diagnostic criteria. An unknown, but probably large portion of patients studied for "schizophrenic thought disorder" will in fact have had affective illness or character disorders. These studies are unlikely to reveal anything fundamental to schizophrenia. Furthermore, Schwartz mentions other confounding factors such as chronicity of illness, length of hospitalization, and drug therapy. It is possible that each of these variables influences a schizophrenic's speech. Moreover, as Schwartz recognizes, not all schizophrenics have "thought disorder." Thus, given the fact that schizophrenia is a heterogeneous disorder, attempts to characterize "schizophrenic speech" may prove to be the quest for a phantom.

Of course, others (Jeste 1982; Meltzer 1979) have been concerned about the research implications of heterogeneity among schizophrenics. Analogously, it is incorrect to lump all aphasics together and then look for a unifying linguistic defect. In fact, the speech of aphasics differs considerably according to aphasia type (see Table 1). Buchsbaum and Haier (1978) and Buchsbaum and Reider (1979) have suggested certain pragmatic research strategies that attempt to prevent the loss of illuminating observations by the averaging out of findings across heterogeneous subgroups. They argue that a diagnostic group such as schizophrenia, no matter how rigorously and reliably defined, is likely to be heterogeneous biologically. They suggest grouping patients by some biological independent variable (putatively related to mental disorder), such as abnormal platelet monamine oxidase. These biologically homogeneous subgroups can then be examined for differences in behavioral (dependent)

Table 1 (Ovsiew & Hier). *Some statistical measures of language in aphasia and schizophrenia*

	Mean length of utterance	Clauses per 100 sentences	Ratio of pronouns to nouns	Lexical diversity	
				Common words[a]	Entropy[b] (bits)
Normal speakers (N = 6)	11.0	48.7	0.9	76%	5.7
Broca's aphasia (N = 3)	5.0	0.0	0.1	72%	3.6
Wernicke's aphasia (N = 3)	8.8	25.0	2.0	84%	5.2
Schizophrenic speaker A	7.3	13.3	1.1	77%	5.8
Schizophrenic speaker B	8.5	23.1	0.9	62%	6.1
Schizophrenic speaker C	11.3	150.0	1.7	93%	5.1
Schizophrenic speaker D	10.2	100.0	1.4	90%	4.9

[a]Common words are percentage of words in sample that occur 1,000 times or more in the Lorge-Thorndike word count (Thorndike & Lorge 1944). [b]Entropy is a statistical index of diversity (expressed in bits) based upon information theory where Entropy = Σ Pr $\log_2$ Pr (McIntosh 1967). Pr is the probability of occurrence of a word. If all words are identical, Entropy = 0 bits.
Source: A. G. Schindler and D. H. Hier (unpublished observations).

measures. Identification of a subgroup of schizophrenic patients with abnormal language might emerge from such a strategy. Furthermore, specific brain dysfunction (such as left temporal lobe disorder) might be suggested by these language findings, and the correlates of this dysfunction could be sought.

Unresolved remains the question as to what abnormal language is. For language to be properly considered abnormal it must in some sense violate phonological, lexical, or syntactic conventions. The speech of aphasic patients violates these conventions in predictable ways. Simple quantitative measurements capture some of the aberrant nature of the speech of Wernicke's or Broca's aphasics (see Table 1). The utterances of Broca's aphasics tend to be short (low mean length of utterance [MLU] and low number of subordinate clauses). Lexical diversity is low, and there is an excess of "substantive" words (nouns) over "filler" words (pronouns). Wernicke's aphasics show greater but still subnormal lexical diversity, a longer but still subnormal MLU. Wernicke's aphasics also show marked word-finding difficulties as manifested by a high ratio of filler words to substantive words. As Schwartz points out, investigation of the speech of schizophrenic patients has not yet revealed any consistent or uniform pattern of deviation from normal such as has been demonstrated in aphasic patients. Nonetheless, one may question whether there may be unidentified subgroups of schizophrenic patients with aberrant language as well as aberrant thought content. From a statistical point of view it is of some interest that the speech of speakers A and B is most abnormal in terms of "thought disorder" yet most normal "statistically." The speech of speakers C and D is somewhat abnormal statistically, showing an impoverishment of lexical diversity as well as an excess of pronouns over nouns. These two speech samples show some similarity to the speech of Wernicke's aphasics. We tend to agree with Schwartz that the speech of schizophrenics often sounds peculiar not because of abnormal language but rather because of abnormal thought. Careful statistical analysis of the speech of schizophrenics may settle the issue as to whether any recognizable subgroup of schizophrenics shows persistent deviations from linguistic norms (cf. Faber & Reichstein 1981; Silverberg-Shalev, Gordon, Bentin & Aranson 1981).

The study of aphasia has been the cornerstone of neuropsychological research because it has followed two complementary procedures. First, subgroups demonstrating particular patterns of dysfunction, Broca's or Wernicke's aphasia, for example, have been identified. Second, careful clinico-pathologic correlation has been made. The research on "schizophrenic language" reviewed by Schwartz has failed to carry out either of these procedures and has been correspondingly unproductive.

Language in schizophrenia: A social psychological perspective

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For many years, experimental research into language in schizophrenia has been guided by two main assumptions: that language disturbance is widespread among schizophrenic patients and easy to detect and measure; and that schizophrenia is fundamentally a cognitive disorder, in which language disturbance is secondary and results from an inability to regulate thoughts. According to Schwartz – and I agree – neither assumption is justified. The majority of schizophrenic patients use language perfectly normally most of the time; and what causes the disturbances when they do occur is still far from clear. There is nothing to suggest that competence is lacking, and the best evidence at present points to a failure in performance. Many schizophrenics have difficulty with selective attention – particularly adopting a response set, or "pigeonholing" as Broadbent (1971) has called it – and that, Schwartz argues, is what disturbs their use of language.

"Is There a Schizophrenic Language?" is a very useful paper. Many empirical areas are reviewed – among them, syntax and grammar, semantic content, word associations, Salzinger's (Salzinger, Portnoy & Feldman 1978) immediacy hypothesis, communicability, and pragmatic deficits – and, for the most part, the arguments are well-balanced. There is, however, one major weakness, in my view: Schwartz says too much about language as regulation and too little about language as communication. To be fair, the traditional literature shows exactly the same bias – but the balance has changed since the mid-1970s, and a number of rather different developments have begun to take place. There are two approaches in particular that deserve attention, and I shall try to demonstrate that, together, they offer a new interpretation: The central problem for schizophrenics lies not

in *regulating* their thoughts, but in *communicating* them in a way that the listener can follow.

The first approach has been to analyse schizophrenic discourse; some of the most interesting work has come from Rochester and her colleagues (Rochester & Martin 1979; Rochester, Martin & Thurston 1977). They conducted a detailed analysis of tape-recorded monologues involving three sample populations: thought-disordered schizophrenics, non–thought-disordered schizophrenics, and normal control subjects. Unfortunately, there were only 10 individuals in each group, at least in the 1979 account, and, as Schwartz rightly points out, the ratings of thought disorder were made from the passages themselves; nevertheless, there were some promising results. First, schizophrenic patients, especially those who were thought-disordered, used fewer cohesive ties than the other subjects, with the result that the links between their phrases and clauses were often weak and tenuous. Second, the thought-disordered group showed marked abnormalities in its reference networks. Sometimes these patients would present new information but then fail to follow it up, so that the listener was left wondering what had become of the loose ends; and sometimes they would presume information they had not actually given, or make ambiguous references to earlier text in such a way that the listener was simply unable to locate the referent. What was happening, it seemed, was a failure to take the role of the listener.

The second approach has been to examine conversations. The only reported study, so far as I know, is one of my own (Rutter 1982). Earlier, I had attempted to replicate Rochester's work, with a sample of 25 schizophrenic monologues (Rutter 1981). Although the findings for back reference were very similar to hers, there were no effects for cohesive ties or presenting information, and no differences between thought-disordered and non–thought-disordered schizophrenics. To examine communication properly, we concluded, we must move away from monologues to conversations, and we therefore set up the following experiment.

Twelve schizophrenic patients recently admitted to the hospital each held two five-minute conversations, one with another schizophrenic patient and one with a nurse. The conversations were tape-recorded and transcribed verbatim; a control group of 12 chest patients was examined as well. They too had two conversations, one with another chest patient and one with a nurse, and all the sessions were based on topics from the Choice Dilemmas Questionnaire of Kogan and Wallach (1964). The first 20 utterances from each recording were typed onto strips of paper in random order, and students were asked to reconstruct what they believed to be the original sequence.

The experiment was run twice, under slightly different conditions of reconstruction, but using the same material; there were two main findings. First, the schizophrenic-schizophrenic conversations were consistently the least accurately reconstructed. In the first experiment, the greatest difference was between schizophrenic-schizophrenic and schizophrenic-nurse conversations ($t = 2.4$; df 22; $p < 0.025$) while in the second it was between schizophrenic-schizophrenic and chest patient-nurse conversations ($t = 2.5$; df 22; $p < 0.025$). Second, schizophrenic patients made very poor use of questions. In normal, everyday conversations, people generally ask appropriate questions and receive appropriate answers, and the result is that question-answer sequences are redundant and predictable, and therefore relatively easy to reconstruct. Schizophrenic conversations, we found, were quite different. Whereas for chest-patient conversations question-answer sequences were reconstructed significantly more accurately than other sequences ($t = 1.9$; df 22; $p < 0.05$ in the first experiment, and $t = 2.4$; df 22; $p < 0.025$ in the second), for schizophrenic conversations there was no difference. Schizophrenic patients, it appeared, had asked inappropriate questions and given inappropriate answers, and, once again, they had failed to take the role of the other person.

What, then, can we conclude? Schizophrenic patients whose language is disturbed find it difficult to take the role of the listener and fail to structure what they say in a way that is easy to follow and reconstruct. Their disturbance lies not in regulating and organising their thoughts, but in expressing and communicating them – a conclusion very different from the traditional view. For Schwartz, the most useful approach to language in schizophrenia is *cognitive;* for me, it is *social*.

What is meant by schizophrenic speech?

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After reviewing the pertinent experimental literature, Schwartz has concluded that schizophrenics may not differ from nonschizophrenics in their language competence. Most investigators and clinicians would probably agree. The peculiarities of "schizophrenic speech" rather than "schizophrenic language" are what have always fascinated students of schizophrenia. According to Schwartz, "schizophrenic speech" is "bizarre" and "easy to recognize." Attempts to distinguish schizophrenics from nonschizophrenics on the basis of form and content of speech, however, have often been unsuccessful. Why?

Diagnostic style is certainly one factor. The less stringent the criteria for making the diagnosis of "schizophrenia," the more likely we are to include individuals whose speech contains little "schizophrenese." Many of the language and speech studies cited by Schwartz were carried out in an era characterized by the overdiagnosis of "schizophrenia," compared to present practices. Another factor has to do with severity of illness. "Easy to recognize" schizophrenic speech is generally elicited from chronic, deteriorated patients. The frequency of occurrence of schizophrenic speech mannerisms in moderately or mildly ill patients is probably rather low.

I believe that there is a still more important reason why controlled studies have often failed to distinguish schizophrenics from nonschizophrenics on the basis of language performance. Analyzing "schizophrenic speech" requires that we resolve the phenomenon into its various elements and look for differences between schizophrenic messages and those of nonschizophrenics for each of the speech categories we are studying. But if we think of "schizophrenic speech" as a combination of verbal and vocal elements, no one of which distinguishes schizophrenics from nonschizophrenics, we will not be surprised that studying one variable at a time has borne little fruit. To analyze schizophrenic communication in this way is to destroy its uniqueness.

The quality of bizarreness in schizophrenic messages is not attributable to any one element. I believe that Steingart and Freedman (1976) have come close to describing the essence of schizophrenic speech in their characterization of it as the transmission of incomprehensible messages in grammatically intact form. When both the semantic and syntactic aspects of speech are disorganized, the effect is more apt to be one of confusion rather than bizarreness. Children are able to speak nonsense without appearing bizarre because they demonstrate immaturity in both form and content. Entertainers can create nonbizarre, comic effects by speaking nonsense in grammatically correct language, but I suspect this is accomplished by a combination of appropriate gestures, ordinary rather than esoteric thematic content, normal vocal dynamics, and the absence of obscure references.

I would like to make a few comments on Schwartz's brief discussion of the Watergate transcripts. According to the author, several of his colleagues judged a certain passage to be "moderately schizophrenic." The excerpt in question was uttered by former president Nixon and is described as "repetitive, loose, and difficult to follow." Citing Gold's book on the White House transcripts, Schwartz goes on to attribute similarly constructed remarks to "many" of Nixon's colleagues.

In my own detailed analysis of the Watergate transcripts (Weintraub 1981), I was unable to discover evidence of psychosis in the speech of any of the participants. At most, Nixon may have been suffering from a clinical depression at the time the Watergate coversations were recorded. How can we account for the fact that trained clinical psychologists judged a sample of Nixon's speech to be "moderately schizophrenic"?

A close reading of the Watergate transcripts indicates that none of the participants had the slightest difficulty understanding the others. Certain portions of the transcripts appear "difficult to follow" only when taken out of context. We must remember that the transcripts record conversations among individuals who shared certain assumptions and knowledge about the subjects under discussion. These individuals had no need to provide each other with explanations and clarifications that a stranger would need. Most conversations among family members and friends tend to be rambling and difficult for strangers to follow.

As Schwartz points out, schizophrenic speakers tend to assume that their listeners know more about them and the subjects they are discussing than they actually do. This assumption contributes to the mysterious quality of schizophrenic speech. To be sure, schizophrenics are not alone in making this assumption. Children and certain ethnocentric adults often address strangers as if they were relatives or friends. Readers wishing to learn more about the effects of dialogue and social class upon the formal characteristics of speech are referred respectively to Vygotsky (1962) and Bernstein (1960).

Stages in the disintegration of thought and language competence in schizophrenia

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Schwartz's target article demonstrates an exhaustive knowledge of the problem of schizophrenic thought and language. It provides a rich source for the reader. Particularly important is the author's creative skepticism. In my opinion, however, this skepticism goes too far when at the end of his paper Schwartz comes to the conclusion that "we may never be able to explain the schizophrenic language deficit because it probably doesn't exist."

For the clinician the schizophrenic's thought and language competence disturbance is a reality. Two basic elements in this reality are pointed out by Kraepelin (1913) and Bleuler (1911). Kraepelin described the "derailment" of the associative process in terms of semantic or phonetic relations that cause semantic "hiatuses" in thought (as expressed in speech). Bleuler proposed the term "looseness" of normal associative pathways as the basis for the development of Kraepelin's derailments and for other characteristic associative disorders described by him.

Thus when a schizophrenic patient says, "I have a triangular medallion because the square root of 64 is 8," a peculiar thinking disorder is at hand, the chain of thought being broken between the words "triangular medallion" and "square root" by a "derailment" of the semantic relationship (through a semantic hiatus). In such a case the patient does not understand and cannot correct the "mistake."

The process of deterioration of schizophrenic thought (as expressed in language competence) can be presented schematically in four stages:

1. The first stage is one of disturbance of fine semantic distinctions and of looseness of semantic associations without apparent paralogical turns of thought and without gross semantic hiatuses. This stage of semantic deformation of concepts is difficult to objectify (unless there are premorbid records of the patient's speech). It constitutes one of the signs giving the researcher the "feeling" that schizophrenia is involved.

2. The second is a stage of looseness of semantic associative relations with paralogical turns of thinking but without gross semantic hiatuses. (I cannot concur with Schwartz's inclination to deny the contributions of Von Domarus 1944. The validity of the latter's contribution is supported convincingly by the work of Arieti 1955; 1959; 1971; I too have studied paralogical thinking 1973; 1981a.)

It should be pointed out that whereas patients in stage 2 draw logically unfounded conclusions (identifying part and whole according to Levy-Brühl's 1927 law of participation, quadrupling terms in syllogisms according to classical principles of paralogism, etc.), in the subsequent stages of semantic derailment they grossly violate the logical relations of thinking.

3. The third stage is one of gross semantic hiatuses but without dissociation of the syntactic relations of sentences. This stage of diverging semantic and syntactic disturbances is characteristic of schizophrenic thinking and is denoted in the German-speaking countries as "Zerfahrenheit des Denkens."

4. Finally there is a stage of semantic and syntactic disintegration of thinking terminating in forms of discourse termed "word salad." (A classification of hiatuses in schizophrenia modeled on slips of the tongue in normal people can be found in Zaimov 1981a.)

Naturally in many cases the patient's thought process exhibits elements from more than one of the stages delimited above, since the disturbances in thinking and language competence in schizophrenia are very dynamic.

In a study of the thought process in 20 chronically ill schizophrenic patients (with disturbances chiefly in the third stage) an enumeration of the semantic hiatuses per 100 words (out of a total sample of 400 words per patient) indicated that in a conversation in the consulting room they made many more hiatuses than in the process of ergotherapy, discussing well-mastered work (average hiatus percentage decreased from 28.85 to 6.20). One of the patients had 36% hiatuses in the consulting room, but no hiatuses at all when he was playing cards. Women patients producing only word salad sharply decreased their number of hiatuses while they were using caressing language with children (Zaimov, Geranliev, Beltchev & Zaimova 1960).

In terms of the stages of disintegration of thought and language competence described briefly above, it is evident that Schwartz's suggestion of a similarity with the thought process of "nonschizophrenic patients, poets and even 'normals'" could apply only to the first stage (e.g. in cases of simple, slowly progressing forms of schizophrenia). In the work of modernist poets and in humor (anecdotes) unexpected turns of thought similar to semantic dissociation are sometimes intentionally used; such dissociations can also occur in the dreams of healthy people.

In a series of papers I have tried to demonstrate that associative derailments of a "schizophrenic type" can be observed not only in schizophrenia but also elsewhere, which means that disturbances in thinking and language competence in schizophrenia are relative rather than absolute. (A short review, with references, of my investigations concerning this problem can be found in Zaimov 1981b.)

So whereas Schwartz is right that many aspects of the problem of schizophrenic thought and language competence remain unclear, investigations in this field have nevertheless revealed

certain characteristic stages which are useful to the clinician both in diagnosis and in treatment.

Author's Response

If there were such people as schizophrenics, what language would they speak?

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It is not surprising that a paper concerned with psychiatric diagnosis, brain-behavior relationships, cognitive psychology, linguistics, and social behavior should provide latitude for substantial disagreement and controversy. As the commentaries touch on most sections of the target article, I have used the same headings in this response. In a change from the usual practice in these Responses, I have left the general points for last as they serve both to sum up the present state of knowledge and to point out possible future research directions.

I. What is schizophrenia? As noted in the target article, schizophrenia is clearly not a homogeneous category. Bleuler (1950) referred to "the schizophrenias," and he was doubtless right. Thus, I must agree with **Bannister, Chapman & Chapman, Colby, Darby, Knight & Sims-Knight, Ovsiew & Hier, Weintraub,** and anyone else who criticizes diagnostic practices that assume a nonexistent homogeneity to schizophrenia. As I pointed out (and Chapman & Chapman reiterate), it is very likely that the heterogeneity of the subjects called "schizophrenics" is at least partly responsible for conflicting results across studies.

Not only do the commentators and I agree that schizophrenia is a heterogeneous category, but many commentators also concur with my view that the relationship between peculiar speech and schizophrenia may be largely tautological (**Colby, Mancuso, Sarbin & Heerdt**). The tautology arises because speech deviance (as in the *DSM III* American Psychiatric Association 1980) is often one of the criteria for the schizophrenic diagnosis. It is still possible to diagnose schizophrenia without reference to speech because (as **Andreasen, Bannister,** and Colby note) schizophrenia is a disjunctive category. Nevertheless, Mancuso et al. are right in arguing that independent definitions of speech deviance and schizophrenia are necessary if we are to avoid circular reasoning when studying speech-disturbed schizophrenics.

Some commentators suggest that schizophrenic subgroups be identified (**Chapman & Chapman, Knight & Sims-Knight, Weintraub**). There can be no argument with this. One way to accomplish it is to identify separate biological markers for the various subtypes (**Darby, Hemsley, Ovsiew & Hier**). Care must be taken in this approach, however, lest we muddy the distinctions we already have. Darby, for example, includes autistic children among his schizophrenic subtypes despite the evidence that these disorders are quite distinct (Schwartz & Johnson 1981). (Darby, by the way, states that most researchers in schizophrenic cognition assume no neurological problem in their subjects. I haven't taken a poll, but I would be very surprised to find that this was true.)

Perhaps, in the future, we will have a new taxonomic system (**Colby**) based on physiological and behavioral markers that will permit us to study truly homogeneous patient groups. Until then, however, we must decide what to do with the hundreds of studies already in the literature. Colby appears to opt for dumping the lot and starting fresh. **Chaika** disagrees. My own view is closer to Chaika's. Many of the experiments discussed in the target article defined their subject populations quite clearly. These experiments can easily be repeated; their findings can be assessed by other investigators. Moreover, schizophrenia (although not homogeneous) is not all that difficult to diagnose. Colby is right, of course, that reliability studies could be better controlled. But the force of his objection is diminished by noting that he himself (Colby 1981) cites the same research as evidence for the reliability of the "paranoia" diagnosis. Schizophrenia (I will use the singular for ease in writing, the plural character of the disorder having already been acknowledged) is as easy to recognize as many equally heterogeneous medical disorders. It seems perfectly legitimate to evaluate the literature as it currently stands on the understanding that future refinements in diagnosis will make possible even finer distinctions. Indeed, it is typical in medical history to proceed from general categories ("the fevers," for example) to more specific illnesses that share some characteristics but have their own unique features as well.

Mancuso et al. are unhappy with my medical analogies. They feel that I am committed to a "disease model" of "inappropriate discourse" and that, unlike most medical diagnoses, the label "schizophrenia" has no predictive validity. The first objection is spurious as there is much more to schizophrenia than inappropriate discourse. In fact, the diagnosis can be made without reference to speech at all (**Andreasen**). The conditions referred to as schizophrenia include a range of characteristics, many of which appear to have genetic and neurological etiologies (Rosenthal & Kety 1968). Mancuso et al.'s second objection is equally invalid. The course of schizophrenia, the response to certain drugs, and the incidence of similar conditions in family members can all be predicted from knowing that a patient has been diagnosed schizophrenic. The schizophrenic diagnosis has as much predictive validity as many accepted medical conditions (epilepsy and many forms of cancer, for instance).

Mancuso et al. prefer to think that diagnosing someone as schizophrenic is a moral judgment about an individual's behavior. This is certainly not a new idea (see Szasz 1960), nor is it entirely incorrect. But, it's not clear where they think their view leads. Are they arguing that there are no physiological concomitants of schizophrenia? If so, what do they make of the evidence summarized by **Darby**? Are they arguing that these neurophysiological problems should be ignored? Would the etiology of general paresis ever have been identified if physicians and researchers had refrained from making diagnostic judgments about their patients even though many of

these judgments could have been considered "moral," at least at the time?

Schizophrenia is a heterogeneous diagnostic category. Further refinements are necessary and will doubtless be forthcoming. This doesn't mean that all of the existing literature is worthless. If carefully examined, many of the mistakes of the past can serve as useful lessons for the future.

II. What is language? In order to decide whether something exists, we must first define what it is we are talking about. In the target article, a distinction was made between language, speech, and thought. Bleuler (1950) made similar distinctions and so have most linguists. Having discussed these distinctions at length, I am at a loss to explain **Bannister**'s claim that I use the terms "saying odd things," "schizophrenia," and "thought disorder" interchangeably. Indeed, it is Bannister himself who argues that disorders of language and speech are difficult to tell apart. Sometimes they are. But the problem is not as severe as Bannister states. For example, stuttering and elective mutism are clearly speech disorders, not language disorders.

For different reasons, **Neuringer** and **Martin** feel that the distinctions made between language, thought, and speech are too restrictive. Neuringer is particularly concerned about the distinction between speech and thought. He agrees that thought can proceed without speech but asks whether speech can proceed without thought? The answer he expects is clearly "no." But speech does in fact appear without thought, motivation, or control in patients suffering from Tourette's syndrome (Shapiro, Shapiro, Brown & Sweet 1978). Clinical and research studies of aphasia, stuttering, and Tourette's syndrome (to name just three) show the importance of distinguishing between language, thought, and speech. Neuringer's unsupported assertion that speech and thought have an "invariant correlative identity" also contradicts the clinical facts. There are external factors that can affect each individually (again, see studies of aphasia as compared with stuttering). Furthermore, Neuringer's feeling that thinking can only be studied through language is just not supported (see Posner 1978).

Neuringer points out that I used the word "language" when I should have used "speech." As he notes, this illustrates the difficulties involved in using everyday terms in specialized ways. But, just because these distinctions are difficult doesn't mean we should ignore them. The alternative is almost certain confusion. (For further clarification of the distinction between thought, language, and speech, see **Boller**'s helpful commentary.)

Martin's objections to my definitions of language, thought, and speech are based on the definitions' idealization of language into a set of formal rules. He reiterates some objections to Chomsky's work and to linguistic formalisms in general. There is nothing new in this. Chomsky (1975; 1980; see also *BBS* 3(1) 1980) has responded to these criticisms; his arguments can be consulted by readers interested in learning whether the formal approach has any life left in it. In a sense, Martin has erected a straw man. I have no objection to studying schizophrenic discourse or pragmatics. On the contrary, the analysis of texts and the study of pragmatics (see **Buckingham**'s commentary for one approach to these matters) are quite important to our understanding of schizophrenia. But is it indeed arbitrarily narrow, as Martin claims, to consider these matters related to – but not part of – language? Martin himself agrees that pragmatics is outside language for most linguists. On the other hand, he would like to argue that deficits in discourse cohesion do reflect a language deficit. To a great extent, this is an empirical question. If a theory of language can be developed that includes within it the ability to explain why we sometimes violate the rules of conversational implicature, then such matters are part of language. At present, our theories of syntax and the meaning of sentences are constructed at a level of analysis different from the one Martin prefers. The phenomena he refers to may be explained by their own set of rules, but they are not the set that explains syntax, morphology, and phonology. The deficits that occur in patients suffering from one or another aphasic syndrome fall within the areas of syntax, morphology, and phonology. As far as I know, there is no aphasic syndrome in which the deficit appears in texts but not in sentences.

As things stand, it is possible for someone to have full grammatical competence and no pragmatic competence. This appears to be the case for some schizophrenics. At present no single theory of language can account for this pattern. Until such a theory is forthcoming, one that deals with syntax as well as discourse processes, it seems only reasonable to keep the two separate.

(One final point. The commentaries and the discussion thus far should disabuse **Kertesz** of the notion that I have chosen the "safe side" and that no one denies the independence of thought and speech.)

III. What is meant by schizophrenic language? In the target article I noted that schizophrenics speak coherently most of the time (some do so all of the time). Inconstancy in schizophrenics' linguistic productions was also noted by **Bleuler, Chaika, Neuringer,** and **Zaimov.** By themselves, these inconstancies are difficult to interpret. They could mean that schizophrenics have lapses in competence as Chaika suggests or they could reflect a performance deficit. Since the speech errors made by schizophrenics are similar to those made by nonschizophrenics, and since these errors occur only rarely (and at the level of texts), it seems unlikely that they are the result of a competence deficit like aphasia (see Rosenberg & Abbeduto 1982 for a longer discussion of this point).

IV. Associationism and schizophrenic language. Associationism as a theory of language has been severely criticized by many writers (see Schwartz 1978b for a review). Nevertheless, associationism in its most primitive form – the word association test – just will not go away. In earlier reviews (Schwartz 1978a; 1978b), I concluded that there was little evidence that schizophrenics give rare word association responses. **Kertesz** feels that this "does not ring true." He provides no data; nor does he try to refute my earlier arguments. **Chapman & Chapman** do attempt to provide such data; their argument deserves close scrutiny.

According to **Chapman & Chapman,** schizophrenics show a commonality deviance, not to all words but primarily to "flat-slope" (also known as "high-interference"

or "ambiguous") words, those without a single dominant associate. Chapman & Chapman claim that this greater deficit in commonality for "flat-slope" words was reported by Lisman and Cohen (1972) and reconfirmed by Magaro, Abrams, and Cantrell (1981), Penk and Kidd (1977), and Penk (1978).

A close look at these studies, however, reveals a picture very different from the one described by **Chapman & Chapman.** Even a cursory look at Lisman and Cohen's data (1972, Figure 2, p. 185) reveals that the big differences between schizophrenics and normal individuals do *not* occur with the "flat-slope" words (as Chapman & Chapman claim) but rather with the *steep-slope* words. There was a small tendency for schizophrenics to give rarer responses than nonschizophrenics to one of the two flat-slope lists, but this tendency was dwarfed by their much greater tendency to give rare associates to the steep-slope words. As Lisman and Cohen note, "all differences between diagnostic groups appear negligible for the flat slope words in contrast to the sharp differences apparent with the steep slope words" (1972, p. 185). These results are exactly *opposite* to the ones Chapman & Chapman attribute to the study.

According to **Chapman & Chapman,** Magaro, Abrams, and Contrell (1981) reconfirmed a finding that Lisman and Cohen (1972) never obtained. Magaro et al. (1981) compared paranoid and nonparanoid schizophrenics on several tasks, including a word association task using steep- and flat-slope words. Aside from noting that nonparanoid patients gave fewer common associates to *steep*-slope words and were also less likely to recall their associates to *any* word than the paranoid patients, Magaro et al. do not report response commonalities. In other words, Magaro et al. present no evidence or data to support Chapman & Chapman's claim that schizophrenics show deviant commonality on flat-slope words.

This leaves Penk's studies. Penk and Kidd (1977) found that schizophrenics gave fewer common responses to flat-slope words than did "neurotics." When compared with medical-patient controls, they gave rarer responses to all words. Penk (1978) found an increase in common responses (to flat- but not to steep-slope words) after treatment among schizophrenics but not among neurotics. For one group of neurotics, commonality actually decreased with treatment! Why this should happen, and the amazing resistance of his data to normal regression to the mean is not explained by Penk. One cannot help but worry about sampling error, given these results.

In summary, **Chapman & Chapman**'s claim that schizophrenics show greater deviance in commonality on flat-slope words is refuted by Lisman and Cohen (1972), and not even addressed by Magaro et al. (1981). The pattern was found in some comparisons by Penk and his colleagues, but some of these results are statistically peculiar. Somehow, Chapman & Chapman see the results of these studies as supporting a response competition theory of schizophrenia.

In their commentary, **Chapman & Chapman** take me to task for holding researchers to an unrealistic standard and for making too much of negative findings. As I have tried to show here, their standards are indeed different from mine. Contrary to Chapman & Chapman's assertion, Lisman and Cohen's conclusion that schizophrenics have normal associative repertoires is "relevant." For one thing, it describes fairly their results as well as the majority of findings in the literature.

Defining "meaning bias," Chapman and Chapman (1965, p. 139) state that "a person has, to any one word, a series of meaning responses . . . these several meaning responses to a single word differ in strength." Surely these "meaning responses" sound a lot like word associations. Nevertheless, **Chapman & Chapman** say they are different, and I must take them at their word. Their acknowledgment that words taken out of context are treated differently from words in sentences is very welcome and reinforces the essential futility of trying to understand language by studying associations to words.

Also on the topic of meaning biases, **Hemsley** mentions a study by Williams, Hemsley, and Denning-Duke (1976) which he claims found that only chronic schizophrenics have a "strong meaning response bias." This wasn't true in their Experiment 1. The difference between acute and chronic schizophrenics was not significant. Moreover, prison inmates (Rattan & Chapman 1973) and nonschizophrenic patients (Naficy & Willerman 1980) also show a strong meaning bias, suggesting an effect attributable to institutionalization rather than schizophrenia.

Word association studies have been going on for about a century. They will continue to be conducted in the future. Thus far, they have not revealed any deficit specific to schizophrenia (see the commentary of **Asarnow & Watkins** for additional discussion of word association studies).

V. Schizophrenics' knowledge of linguistic rules. Some schizophrenics, **Chaika** suggests, produce speech similar to that produced by some aphasics. **Boller,** on the other hand, feels that schizophrenics do not demonstrate aphasic features in their language. **Lecours** feels there are quantitative differences between some subgroups of schizophrenia and normal individuals. (Lecours also feels that whether schizophrenic speech deviations are deliberate or whether they are manifestations of a thought or language disorder is "irrelevant." Fortunately, few researchers take this essentially atheoretical approach.) **Osview & Hier** agree that no consistent patterns of language deviance have been identified in schizophrenia. **Andreasen** feels that schizophrenics are competent in language perception but not in language production.

As noted in the target article, such disagreements are common in the literature even though all theorists use the same data. **Ovsiew & Hier** suggest that the best way to proceed is to look for consistent patterns of speech deviance in schizophrenic subgroups. These speech syndromes can then be linked with neurological findings. **Lecours** advocates something similar, an approach he attributes – mysteriously – to French and German neurologists. I most certainly agree. This approach is not likely to be easy. Consider the table constructed by Ovsiew & Hier, for example. It shows marked similarity in the speech of a patient suffering from Wernicke's aphasia and an excerpt from the Watergate tapes. Clearly, the effects of context (**Weintraub**) cannot be ignored.

The literature relating aphasia and schizophrenia has been reviewed several times, most recently by Rosenberg and Abbeduto (1982). These reviewers also found little evidence for dysfunctions in syntax, morphology,

phonology, or intonation among schizophrenics. They conclude that schizophrenics have a problem in performance, not linguistic competence.

Martin suggests that defects in discourse cohesion should also be considered language defects. This argument, which is also made by Rochester and Martin (1979), is based on an alleged left hemisphere deficit in schizophrenia. Since the left hemisphere is primarily responsible for language competence, and since the structure of discourse is at least language related, discourse failure is taken to be a failure in language competence. Not only is this logic hard to follow, but the whole notion of left hemisphere damage in schizophrenia is quite speculative (see Rosenberg & Abbeduto 1982). In our own work (Schwartz & Kirsner 1982) we have shown that many findings attributed to hemispheric specialization in normal subjects can actually be shown to result from selective attention. There is every reason to believe that the same holds true for schizophrenia.

VI. Hypotheses based on the content of schizophrenic speech. It is suggested by **Laffal** that schizophrenic speech, like poetry, can be understood – if one tries hard enough (**Colby** agrees). Laffal also recommends that techniques similar to those applied to explicating poetry be applied to clarifying schizophrenic discourse. Why these efforts should be necessary in the first place is not explained by Laffal's work.

VII. Pragmatic deficits in schizophrenia. Clinical investigations and laboratory studies agree that schizophrenics have pragmatic deficits. **Andreasen, Buckingham, Chaika, Colby, Mancuso et al., Martin, Rutter,** and **Weintraub** appear to agree with this position as stated in the target article. I am indebted to Buckingham for providing a useful summary of Grice's work. Morgan and Green (1980) also provide a rule-based approach to pragmatics similar to the one available for semantics. These authors' work supports Martin's notion that pragmatics itself can be considered a semiotic system.

The main issue is whether these pragmatic defects can be considered to reflect a deficit in language competence. **Andreasen** seems to think they can, and she attributes her position to many "psycholinguists." **Martin,** on the other hand, says that most linguists would put pragmatics outside language competence. Most commentators appear to agree with Martin. **Rutter** sees the problem as "social"; **Buckingham** hypothesizes that attentional deficits are responsible for pragmatic defects; **Mancuso et al.** see social interaction as the source of the problem; and **Weintraub** also emphasizes the social context. Needless to say, I side with the majority. Pragmatic defects are important, but they are not part of language competence.

VIII. Is schizophrenic speech the result of an information-processing deficit? Information-processing hypotheses concerning schizophrenic cognitive deficits come and go with disturbing frequency. Few hypotheses ever die away completely. **Zaimov,** for example, still finds the Von Domarus principle (schizophrenics are paralogicians) useful despite the total lack of support for its validity. Some hypotheses are so vague and circular that they explain nothing. **Neuringer,** for example, favors theories that attribute schizophrenic speech to a lack of energy or an attempt to avoid social contact. Both notions are classic tautologies based on schizophrenic behavior with no independent measures of energy or motivation suggested.

I suggested that pigeonholing (a defect in selective attention) is responsible for some of the peculiarities in schizophrenic speech and cognition. I did not suggest that a pigeonholing deficit was the only cognitive problem schizophrenics have – just that it was one supported by the literature. Some commentators questioned this conclusion (**Chapman & Chapman, Knight & Sims-Knight, R. G. Knight, Nuechterlein,** and **Oltmanns**). A few found it reasonable (**Buckingham, Cromwell & Space,** and **Hemsley** up to a point). Some commentators ignored the pigeonholing hypothesis and some misunderstood it (**Chaika, Kay,** and **Lecours**).

Both filtering and pigeonholing are forms of selective attention. The former operates by selecting on the basis of some differentiating stimulus characteristic, the latter by biasing the organism toward certain response categories. Common names, for example, are more easily perceived in noisy situations (and more easily retrieved from memory), not because they are more distinctive than rare names but because of a pigeonholing mechanism that biases responses toward common names. Female voices, on the other hand, are distinguished from male voices by filtering on the basis of vocal characteristics. The distinction between filtering and pigeonholing applies to memory as well as to perception (Schwartz 1974). In the vocabulary of signal-detection theory, filtering is indexed by changes in sensitivity (d') whereas pigeonholing is reflected by changes in criterion bias (β).

Oltmanns, Knight & Sims-Knight, and **Hemsley** consider the distinction between filtering and pigeonholing to be testable and note some of the predictions expected to follow from my position. I must strongly disagree with **Kay,** therefore, who claims that the deficit I propose is not carefully specified and does not generate predictions. It should also be clear that Kay is completely wrong when he says that pigeonholing operates late in the information-processing chain. In fact, pigeonholing is a type of selective attention. It operates at the outset of the information-processing chain. It should also be emphasized that the kind of processing model that Kay describes (a linear sequential model) has been rejected by most cognitive psychologists who admit top-down and recursive processes to be quite common in most information-processing tasks. Finally, the bias toward certain types of information that Kay describes as characteristic of schizophrenics is quite compatible with a deficit in pigeonholing.

Chaika too misunderstands the pigeonholing mechanism. I am not suggesting that schizophrenics cannot put words into categories. In fact, they may have too strong a bias to do just that.

Knight & Sims-Knight and **Nuechterlein** are right in stating that my use of pigeonholing goes beyond the situations described by Broadbent (1971). But, Broadbent meant the two mechanisms to be general information-processing procedures. They would be of little interest if they applied only to a certain experimental paradigm. I think that the two mechanisms can be safely generalized.

Consider the experiment by Knight and Sims-Knight

(1979). Subjects were asked to judge whether sentences had been encountered earlier. Unless we assume that all sentences ever encountered are stored in memory, we must assume that the subjects adopt some sort of strategy to accomplish this artificial laboratory task. Typically, it is assumed that an occurence "tag" is attached to "old" sentences which can then be used to discriminate these sentences from "new" ones. The ability to make these comparisons involves filtering in memory and may be measured using signal-detection statistics (Schwartz 1974). Since Knight and Sims-Knight (1979) found that schizophrenic subjects had no difficulty discriminating old sentences from new, there seems little evidence here for a filtering deficit. The schizophrenics, however, had a more cautious response criterion (or so it seems) for responding "old" to new sentences that incorporated some of the ideas in the old sentences. Here is an example (as suggested by **Hemsley**) where, in a sense, schizophrenics performed more accurately than normal people!

Chaika's explanation for Knight & Sims-Knight's (1979) results is that the normal subjects recall meaning and forget syntax whereas the schizophrenics forget meaning (but apparently not syntax). This "explanation" is merely descriptive and does not say why this should be so.

Nuechterlein indicates that some schizophrenics do have poor sensitivity to perceptual stimuli. This is probably important but not the same (as Nuechterlein notes) as a deficit in selective filtering. Nor is Walker's (1981) experiment a clear case of filtering. Discriminating an "x" from other letters can involve pigeonholing.

Asarnow & Watkins make a convincing case for studying remitted schizophrenics. Their approach is likely to separate some of the acute effects of psychosis and hospitalization from the specific schizophrenic deficit. Their own research has gone a long way toward clarifying this deficit. Some of this work is relevant to the current discussion. In Asarnow and MacCrimmon (1978), schizophrenic groups were compared with nonschizophrenic groups on several tasks including the continuous performance task in which subjects monitor a visual display and press a button when a target digit appears. In their experiment, subjects performed this task in either a quiet condition or a distracting one (while listening to a voice read digits over headphones). Estimating d' and β from their graphs (Asarnow & MacCrimmon 1978, p. 602) reveals that for the acute schizophrenic group, d' in quiet was 2.72 (these estimates, based on graphs, can be somewhat inaccurate) and d' in the distracting condition was 2.86. That is, sensitivity improved. Performance deteriorated, however, because of a 30% change in β. The pattern was similar for the normal subjects: virtually no change in d' (the values were 4.64 and 4.20 for the quiet and distracting conditions, respectively) but a big change in β, from 1 to 2.56. The remitted schizophrenic group performed quite differently. For them, β *decreased* by 50% from the quiet to the distracting condition. They were the only group that behaved this way. Their behavior suggests a deficit in setting a proper criterion that is not evident in the nonschizophrenic or the acute schizophrenic group.

The commentaries contain several suggestions for alternative information-processing deficits in schizophrenia. **Kay** nominates the selective encoding of affective characteristics. He discusses word list studies but presumably intends his hypothesis to apply generally. It is not clear whether all psychiatric patients become sensitized to affective cues, but it should be easy enough to find out. **Buckingham** focuses on a defect in selective attention as do **Cromwell & Space. Asarnow & Watkins** look toward a production deficiency as the major problem in schizophrenic cognition. This view has much to recommend it, but care must be taken to specify precisely what production deficiency they are talking about. When specified precisely, pigeonholing deficits may be production deficiencies.

Asarnow & Watkins and **Oltmanns** suggest that the schizophrenic deficit lies in controlled information processing. The controlled/automatic distinction has become a common one in recent years. I must confess to having invoked it myself in another context (Schwartz 1981). It has been my experience, however, that when the terms "controlled" and "automatic" have been operationally defined (rather than merely invoked as convenient post hoc explanations for experimental findings), it is the automatic processes that are the best indicators of stable individual differences, not the controlled ones. I have discussed this elsewhere (Schwartz 1981) and will not repeat the argument or the data here. I will just ask the reader to imagine learning a skill like tennis or piano playing. At the outset, performance is controlled; most of us must consciously concentrate on what we are doing and we are easily distracted. As we become more proficient, performance gradually becomes automated. Soon we can play the piano while talking, drive a car while listening to the radio, and so on. At what stage are we likely to be able to tell the great tennis player, pianist, driver from the mediocre: at the beginning when *everyone* is learning and making lots of errors or after considerable practice when performance is virtually automatic? I think Oltmanns and Asarnow & Watkins are barking up the wrong tree. It is automatic processes that are most likely to discriminate among groups, not controlled ones.

Cohen suggests by analogy that schizophrenics suffer from a sort of cognitive stuttering. He lists many similarities between schizophrenic cognition and stuttering. To these, I should like to add that some stutterers, like some schizophrenics, respond positively to phenothiazines (Andrews 1977).

IX. General issues and future directions. It is impossible to conclude that schizophrenics are differentially worse in pigeonholing than filtering, argues **R. G. Knight,** because the two tasks have not been equated in the manner described by Chapman and Chapman (1973). This point is a good one, and it has relevance to areas other than schizophrenia. But, taken to extremes, Knight's point becomes a logical absurdity. The problem is that his criticism is basically an empirical one. When we have no theoretical model predicting the outcome of experiments, we need to be sure that our findings are not merely statistical artifacts. However, when we do have well-specified theories, converging experiments using different methods are the most convincing way to demonstrate a hypothesis' validity. One wonders what Knight would say about an experiment that tried to show that one-legged runners ran slower than two-legged runners but completed addition problems just as quickly. Would he still insist that all conclusions were unjustified because

the running task and the math test were not equated for difficulty and discriminating power?

Chapman & Chapman take up a related issue when they note that one study is not as meaningful as the total balance of findings. Of course they are right. There are many ways that research findings may be combined (see Schwartz & Dalgliesh 1982 for a discussion of some methods). From a philosophical point of view, however, it seems only prudent to give more weight to negative findings than to positive ones. After all, finding that apples fall downward off trees got Newton started on a theory of gravity. If other physicists showed that the same holds true for other fruit (pears and peaches also fall) their publication records would grow but it wouldn't help the theory much. But, should one physicist discover a fruit that falls up – now that would make a difference.

Not all relevant research has been reviewed in the target article or in this Response. Some of the commentators have pointed out areas of research that support the general thesis of the target article (**Cromwell & Space,** for example). The field of schizophrenic research is vast; no single article could cover it. Nor will a single defect account for all schizophrenic symptoms. **Chaika**'s belief that all problems must be accounted for by any hypothesis of schizophrenic deficit ignores the heterogeneous nature of the diagnostic category. A better strategy, I think, is to pursue the implications of a hypothesis as far as possible and not to prejudge any hypothesis' explanatory power purely on a priori grounds.

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